THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The new year opens upon strong conditions in the iron trade and sentiment generally optimistic. The prospect that producing capacity will expand as the new year advances is an important factor in the attitude of buyers toward future commitments. At the same time there is no theory but an actual condition behind the pig iron buying that comes up with every week for early needs and the continued scantiness of stocks in the hands of melters of iron. The future of the import trade in pig iron is something with which furnacemen have to reckon. English and German sellers have come to look upon the American demand as a thing to be cultivated, and as famine prices on this side are disappearing, leading to the belief that foreign iron can soon be dispensed with, there is a disposition on the part of makers abroad to shade prices to hold their American trade. In the Central West less is heard of foreign iron, though in Pittsburg sales are still made, No. 3 Middlesboro being obtained at $20.50 in carload lots, while $19.25 is a possibility on a full cargo. In the East foreign iron is likely to hold a place for months, being considerably cheaper than domestic brands, and furnacemen are not so sure that the prices made by British and German makers will not have much to do with fixing domestic prices throughout the country in the next six months. While pig iron markets have not been really active in the past week, there is inquiry and buying enough to indicate a better tone than in early December. I nfinished material business has been active enough to affect sentiment all along the line and Central and Western pig iron prices are rather firmer. The recently reported sale of 5,000 tone than in early December. In finished material busito to have had a manipulative purpose, and producers generally are unwilling to sell within $1.50 of that level. Freight rates from Virginia furnaces north and west advance 50 cents Jan. 1 and from Alabama and Tennessee furnaces to Northern points, 10 to 20 cents. The steel market shows considerable active inquiry at Pittsburg and 200,000 tons are reported under negotiation. Prompt Bessemer billets are quoted $29 to $30 with the range for contracts over the next six months about $1 less. A sale of 10,000 tons of open-hearth billets is reported at $31.25 Pittsburg. Independent sheet and tin plate manufacturers conferred at Pittsburg this week on the situation as affecting their interests. No action was taken in view of the slight representation present, and a further conference is expected. In both sheets and tin plates, particularly the latter, there is an improved outlook and several idle mills are being started up. No inroad has been made as yet by domestic mills into the drawback trade under the recent arrangement with the Amalgamated Association. A large contract with Welsh mills is still to be executed and Welsh manufacturers are prepared to make concessions to hold this business. In sheets some ado has been made over a contract placed by roofing manufacturers, but it turns out to be the annual purchase of 110,000 tons by the associated manufacturers of roofing and corrugated material. Activity in bars is reported from the Chicago district and some large business is expected to be closed in the coming month with machinery and agricultural buyers. Structural mills continue to receive good orders, several thousand tons being placed in the Chicago district. The American Bridge Co., among recent contracts, has one for 3,500 tons from the St. Joseph & Grand Island Road—a bridge over the Missouri River. Following the Union Steel Co. deal and the purchase of the Troy Steel Co. plant by the United States Steel Corporation, it is telegraphed that the vast Hill ore interests on the Mesabi range have been acquired by the corporation. Official confirmation is lacking, but as indicated in these columns last week the move is a natural one, as these are the largest Mesabi holdings outside the corporation, and their acquisition by the latter may properly be regarded as a matter of time and terms.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, 429 PARK BUILDING, Dec. 31.

While the amount of new business placed during the past week has been comparatively small, inquiries for Bessemer and open-hearth billets, foundry iron and steel bars are heavy, and the indications are that the buying immediately after the first of the year will be large. It is estimated that inquiries for steel billets amount to 200,000 tons, while the contracts of nearly all the large machinery builders of the country for steel bars have already expired and are to be renewed shortly. The contracts of the agricultural implement manufacturers for steel bars do not expire until April, and many of them run to July 1.

Demand for tin plate is growing and two of the American Tin Plate Co.'s largest mills at New Castle, Pa., will be in almost full operation within a week. Two mills in this district have also resumed operations. The demand for sheets has also increased to some extent and during the week the members of the National Roofing and Corrugating Association renewed their contract with the American Sheet Steel Co., which calls for about 110,000 tons of material. This is the third year that this contract has been made, the material to be taken out during 1903.

The meeting of the Association of the Independent Sheet and Tin Plate Manufacturers, which was held in this city yesterday, was not successful in securing a full attendance of the independent interests. None of the mills in this district were represented at the meeting, which was attended by a half dozen manufacturers. No action was taken relative to prices for the reason that the current quotations of the American Tin Plate Co. and American Sheet Steel Co. cannot be cut and still give a profit to the manufacturer. Another meeting will be held in the near future.

Beginning tomorrow, the H. C. Frick Coke Co. will cease shipping foundry coke, and furnace coke will be supplied to only those furnaces that supply the United States Steel Corporation with pig iron. Coke freight rates will also be advanced, a 10-cent advance being made to all points east of Connellsville, while to Pittsburg an advance of 5 cents a ton will become effective. That to the Mahoning and Shenango Valleys and to Cleveland amounts to 10 cents a ton.

PIG IRON.—The market has been extremely quiet during the past week, sales being limited to small lots almost entirely. We note the sale of 1,500 tons of forge iron for delivery during the next two months at $20.75, Pittsburg. Bessemer iron for delivery the first half of the year is held at $20.75 to $21, while No. 2 foundry for prompt shipment in small lots is selling at $23.50 to $24. No. 3 Middlesboro is being offered here in carload lots at $20.50, and on a cargo lot $19.25, Pittsburg, could be easily done. Coke shipments to the valleys have improved somewhat during the week and few furnaces have been compelled to bank. We make the following quotations:

Bessemer, Valley	$21 50 to 22 00
Bessemer, Pittsburg	22 25 to 22 75
No. 1 Foundry	24 00 to 24 50
No. 2 Foundry	23 00 to 23 50
Gray Forge, Pittsburg	20 75 to 21 00
Chilled Basic, Valley	21 00 to 21 50
Chilled Basic, Pittsburg	21 75 to 22 25

STEEL.—Inquiries for Bessemer and open-hearth billets for delivery during the first half are numerous and it is probable that many contracts will be closed immediately after the first of the year. Bessemer billets for delivery during the next six months can be had at $28 to $29, while for prompt delivery $29 to $30 is asked. We note the sale of 10,000 tons of open-hearth billets at $31.25, Pittsburg, for delivery during the next three months. Foreign steel has also advanced in price and cannot be laid down here under $30 per ton. There is an inquiry in this market for 1,500 tons of billets, the finished product to be exported, thus giving the manufacturer the benefit of the drawback duty. Steel rods are held at $35 to $36, at mill, Pittsburg.

FERRO-MANGANESE.—The market is limited entirely to sales of English ferro, which is selling at $49 to $50 in 50-ton lots and upwards, delivered at buyer's mill. Less than 50 ton lots are held at $55. German manganese in 50 ton lots is held at $51.25.

SPELTER.—The market continues weak and quiet and prime western grades are held at 4.57½c to 4.60c, Pittsburg, in carload lots.

MUCK BAR.—Inquiries for a large tonnage are in the market and the outlook for the new year is excellent. Sales of small lots have been made during the week at $33 per ton.

SKELP.—We note the sale of 800 tons of sheared iron skelp for delivery during the next month at 2.10c, Pittsburg. Steel skelp is held at 1.90c to 1.95c.

RAILS AND TRACK MATERIAL.—There has been little additional new business placed during the week. We make the following quotations: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $43; 12 pounds, $42; 16 pounds, $40; 20 pounds, $39; 25 to 40 pounds, $37 to $38. Track materials: Spikes, 2.15c to 2.25c; track bolts, square heads, 2.05c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—Demand continues strong, but during the past week little new business was placed. Mills are all operating in full and deliveries on many sizes cannot be made in less than four months. We quote: Tank plates ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.75c; marine, ordinary, fire-box, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive fire-box, not less than 2 10c, and it ranges in price to 3c. Plate more than 100 inches wide, 5c extra 100 pounds. Plate 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

BARS.—Owing to the expiration of many contracts the amount of new business in steel bars that will be closed during the next two weeks promises to be heavy. The demand for iron bars is also growing better. Quotations are unchanged as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.70c to 1.80c, Pittsburg, with freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots.

STRUCTURAL MATERIAL.—There has been little new business placed during the past ten days. One of the mills in this district is now running on heavy beams and will continue on these sizes until contracts booked up to two months ago are filled. Quotations are unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

PIPES AND TUBES.—The amount of new business that is being placed is much larger than at this time last year and the tonnage for December will far exceed that for the same month last year. Quotations in carload lots, plus the freight to destination, are as follows:

MERCHANT PIPE.

	Steel		Guaranteed Wrought Iron	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inch	75	65	72	62
7 to 12 inch	73	63	70	60
Plugged and Reamed				
1 to 4 inch	73	63	70	60
Cut 3 to 6 feet				
⅛, ¼ and ⅜ inch	63	52	60	49
½ inch	65	54	62	51
¾ to 6 inch	71	60	68	57
7 to 12 inch	69	57	65	54
Cut 6 feet and longer				
⅛, ¼ and ⅜ inch	64	53	61	50
½ inch	66	55	63	52
¾ to 6 inch	72	61	69	58
7 to 12 inch	70	58	66	55
Extra Strong Plain End				
⅛ to 8 inch	69	59	65	55

Threads only—Same as Plain End, plus 1¼ percent net.
Threads and Couplings—Same as Plain End, plus 2½ percent net.

Double Extra Strong Plain End				
½ to 8 inch	61	51	57	47

Threads only—Same as Plain End, plus 2 percent net.
Threads and Couplings—Same as Plain End, plus 3 percent net.

NOTE: Orders for less than carload will be charged at 12½ percent advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 percent net for 6 feet and longer, and 15 percent net for 3 to 6 feet.

BOILER TUBES.

Steel.

	Percent.
1 to 1½ inches	45
2¼ to 5 inches	62½
1¾ to 2¼ and 6 to 13 inches	52½

Iron.

	Percent.
1 to 1½ inches	36½
2¼ to 5 inches	45½
1¾ to 2¼ and 6 to 13 inches	35½

CASING.

	S. and S. Percent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	63

SHEETS.—The National Roofing and Corrugating Association has renewed its contract with the American Sheet Steel Co. for 1903, calling for about 110,000 tons of black and galvanized sheets. The sheet trade generally is improving slightly. Black sheets in 500 bundle lots and over are held as follows: No. 28, 2.75c; No. 27, 2.65c; No. 26, 2.55c; Nos. 22 and 24, 2.45c; Nos. 18 and 20, 2.35c; Nos. 14 and 16, 2.25c; Nos. 10 and 12, 2.10c to 2.15c. Galvanized: No. 16, 2.60c; No. 18, 2.85c; No. 26, 3.35c; No. 27, 3.60c; No. 28, 3.85c; No. 29, 4.35c; No. 30, 4.50c.

MERCHANT SHEET.—Demand continues strong for all kinds of merchant steel and quotations remain unchanged as follows: Turned cold rolled and ground shafting, 47 off in carload lots and 42 percent off in less than carload lots; tire steel, 2.15c to 2.25c; spring steel, 2.25c to 2.35c; toe calk, 2.30c to 2.40c. The following differentials maintain: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Tool steel is quoted 7 cents and upwards, according to the grade.

WIRE AND WIRE NAILS.—Little new business has been placed during the holiday period, although considerable buying is anticipated during the next two weeks. We quote: Wire nails, carload lots, f. o. b. cars, Pittsburg, $1.85 to $1.90; less than carload lots, $1.95 to $2; plain wire, carload lots, $1.75 to $1.80; less than carload lots, $1.85 to $1.90; barb wire, carload lots, $2.15 to $2.20; less than carload lots, $2.25 to $2.30; staples, carload lots, $2.05, and less than carload lots, $2.15. Galvanizing, 30 cents extra. Cut nails are quoted as follows: Carload lots, $2.05, and less than carload lots, $2.10 f. o. b. Pittsburg, plus freight to point of destination. Terms, 60 days, less 2 percent off in 10 days.

OLD MATERIAL.—The market has been very quiet, although dealers are covering requirements for fully six months with mills, and some railroad consumers are not interested at present, however. We quote gross tons: Heavy melting stock, $22 to $22.50; low phosphorus melting stock, $24 to $24.50; steel rails, $21 to $21.25; re-rolling rails, $22 to $22.50; No. 1 cast scrap, $19.50 to $20; borings and turnings, $11 to $11.50; busheling scrap, $16 to $16.50; old iron rails, $24.50 to $25.

COKE.—Demand for foundry and furnace coke continues strong and for prompt shipment prices range from $5.50 to $7 a ton at the ovens. Bituminous coal is also selling at very high prices, operators in the Connellsville region now holding their product at $5 to $5.50 at the mines for early delivery. For the week ending Saturday, Dec. 20, the output of the upper Connellsville region amounted to 228,668 tons, a falling off of about 4,000 tons as compared with the production of the previous week. The production of the lower Connellsville region amounted to 49,350 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, Dec. 30.

Buying of steel bars has been active during the week under review both for prompt and forward deliveries, the aggregate tonnage sold in the month being considerably greater than for some time past. A large number of consumers have been withholding their orders in anticipation of lower prices, and these have been covering for their forward wants, apparently in the belief that no such action would be taken by mills. There is a better movement also in bar iron, and the price of 1.80c is more generally established, though reports are current of cutting on desirable business. Merchant pipe and wire products have been moving briskly, and sheets have also been in better dmand. Some good sized sales of structural steel have been made in the week; though in the heavier lines of finished material the market is quiet, the active buying of plates, rails and structural material in the last quarter of the year having filled mills up for several months ahead. Prices of pig iron have stiffened, and while little buying has been indulged in sellers anticipate an active movement after the first of January. Bar mills were in the market for scrap in the past week, but the buying has spent itself.

PIG IRON.—The local market is in an anomalous condition. In the expectation of lower prices prevailing the first of January, melters have generally refrained from placing their orders, and have purchased only enough iron for current wants. This has been the order all during December, buying reaching its lowest ebb in the last week of the year when, as one seller put it, the sales scarcely covered expenses. Inquiry was almost entirely for spot iron, and mainly for carload lots. The market seems to have an underlying strength greater than many melters figured on, and prices have not fallen to the plane anticipated. Instead, they have grown stronger, and it is scarcely probable the market will be as weak as it was early in December. No Southern furnace is offering No. 2 iron in this district at less than $19 Birmingham, and local coke foundry is firm at $24.50 at furnace for delivery in the first half of the year. In the last ten days, Valley furnaces have been offering standard Bessemer at $24.10, Chicago, and No. 2 foundry at $24.50, for prompt shipment, which are below the prices at which these grades have been offered in this market by local sellers. Spot iron is quoted $20 to $21 Birmingham, though higher prices are paid for iron on track. There is still a good demand for malleable Bessemer, charcoal and high silicon irons, though consumers are forced to buy standard Bessemer, owing to the scarcity of the two former grades. The car shortage in the South has become very acute, and local furnaces are suffering from a scarcity of fuel. One Iroquois furnace has been relined and is ready to go in blast again as soon as the fuel supply is better.

It has been the custom of leading local sellers to estimate at the end of each year, the total consumption of pig iron in the territory within a radius of 100 to 150 miles of Chicago. Last year they agreed that the consumption during 1901 aggregated 800,000 tons of all grades; this year the figures are put at 1,000,000 to 1,500,000 tons of gray irons, 150,000 to 20,000 tons of malleable iron and 40,000 tons of forge iron—the greatest growth in years. We quote for delivery in the first half as follows:

Lake Superior Charcoal	$25 00 to 26 00
Local Coke Foundry No. 1	24 50 to 25 00
Local Coke Foundry No. 2	24 00 to 24 50
Local Coke Foundry No. 3	23 50 to 24 00
Local Scotch Foundry No. 1	25 00 to 25 50
Local Scotch Foundry No. 2	24 50 to 25 00
Southern Coke No. 1	23 85 to 24 35
Southern Coke No. 2	23 35 to 23 85
Southern Coke No. 3	22 85 to 23 35
Southern Coke No. 4	22 35 to 22 55
Southern No. 1 soft	23 85 to 24 35
Southern No. 2 soft	23 35 to 23 85
Southern Gray Forge	22 35 to 22 85
Southern Silveries	26 85 to 27 35
Jackson Co. Silveries	31 00 to 32 00
Ohio Strong Softeners	26 10 to 27 10
Alabama Car Wheel	27 35 to 27 85
Malleable Bessemer	24 50 to 25 00
Standard Bessemer	24 00 to 25 00

BARS.—The principal feature is the active buying of steel bars that has been going on all month, reaching its height in the last two weeks. The leading producer reports sales were three times greater in December than in November, and practically equal to total production of all its mills. Some large orders were among the contracts placed, though the buying was mainly for lots of 1,000 tons downwards. Angles and hoops are in good demand, the former being very scarce, with premiums paid for prompt delivery. The closing of the year finds the bar iron market firmer, though sales are reported at 1.75c on desirable business. Specifications are coming in freely and mills are in better shape than for some time past. We quote mill shipments, Chicago delivery, Bessemer steel, 1.75c to 1.80c; angles, less than 3x3, 1.85c to 1.90c base; iron, 1.80c to 1.85c; hoops, 2.15c. Prices on lots from store, steel, 2c to 2.10c; iron, 2.15c to 2.20c; hoops, 2.40c to 2.45c; angles, 2.50c to 2.60c.

SHEETS.—Buying of black sheets has improved during the week, though there is little demand for galvanized material. We quote No. 27 black, 2.75c to 2.80c; galvanized, 3.35c to 3.45c; for deliveries from stock, No. 27 black, 2.95c to 3c; galvanized, 75 percent to 75 and 5 percent.

STRUCTURAL MATERIAL.—The Cambria Steel Co. has closed contracts for the steel for the Pope building, 10 stories, 1,200 tons, consisting mostly of 18-inch and 20-inch beams, all for January delivery; for a malt house for Albert Schwill, 600 tons, delivery in February, and 500 to 600 tons to bridge builders and dealers. Other producers report sales aggregating a fair tonnage. We quote mill prices, Chicago delivery, beams 15 inches and under, 1.75c to 2c; 18 inches and over, 1.85c to 2.10c; universal plates, 1.75c to 2c; angles, channels and tees, 1.85c to 2c base. The maximum quotation represents the price asked for prompt delivery. On lots from store cut to length, we quote 2¼ to 2½ cents per pound.

BILLETS.—Local importers report sales of several small lots of foreign billets. We quote domestic open-hearth billets for forging purposes, $37 to $40, according to tonnage and point of delivery; for use in rolling mills, $33.50 to $34. German basic Bessemer billets are offered at $27.50 to $28, seaboard, duty paid, for round lots—5,000 tons and upward—of one size and one carbon. Special carbons can be had abroad but bring higher prices according to specifications and quantity.

RAILS AND TRACK SUPPLIES.—Inquiries continue to be received by "outside" mills for small lots of standard rails. Deliveries, however, cannot be made before the fall of 1903. There is a good demand for track supplies; also for light rails. We quote standard sections, $28; second quality, $27; light rails, 45 pounds, $34 to $35; 12 pounds, $40 to $41, with regular differentials for intermediate sizes. Track supplies, mill shipment are quoted as follows: Angle bars, 2c to 2.10c; spikes, first quality, 2.25c; second quality, 2.15c; track bolts, 3½x¾, with square nuts, 2.85c to 3c per 100 pounds; with hexagon nuts, 3.05c to 3.15c, with usual differentials for other sizes.

MERCHANT STEEL.—New business is of light volume, though specifications are full and active. We quote mill shipments, Chicago delivery, as follows: Spring steel, 2.65c to 2.75c; sleigh shoe, 1.95c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.50c to 2.60c; machinery steel, 2.15c to 2.25, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.30c to 2.40c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots 5 percent to 10 percent higher; cold rolled shafting, carload lots, 47 percent off, Chicago; less than carload lots, 42 percent off, Chicago.

MERCHANT PIPE AND BOILER TUBES.—Though there have been no large orders for merchant pipe placed during the past week, the aggregate tonnage is of good proportions. The moderately mild weather that keeps up has permitted building operations and repairs to be carried on without interruption, and jobbers have been placing small orders for quick delivery right through the month. Boiler tubes are in good demand and without change in quotations. We quote f. o. b. Chicago:

MERCHANT PIPE, RANDOM LENGTHS.

	Black. Percent.	Galv. Percent.
⅛ to ⅜ in., inclusive	66⅔ net	56⅔ net
16 in.	68⅔ net	58⅔ net
¼ to 6 in., inclusive	73⅔ net	63⅔ net
7 to 12 in., inclusive	71⅔ net	61⅔ net

BOILER TUBES.

Steel.

	Percent.
1 to 1½ in.	43⅔
1¾ to 2½ in.	56
2¾ to 5 in.	61
6 to 13 in.	56

Iron.

	Percent.
1 to 1¼ in.	38
1¼ to 2½ in.	36
2¼ to 5 in.	46
6 inches and larger	36

CAST IRON PIPE.—The leading producer reports an order from the city of Chicago for 2,000 tons of pipe. The volume of small orders keeps up their past average and aggregate a good sized tonnage. We quote f. o. b. Chicago, 4-inch water pipe, $36, 5-inch, $35; 8-inch and upwards, $34; gas pipe, $1 a ton higher.

PLATES.—Both mills and jobbers report a good demand, the former being sold up in one instance for the entire year, and in the case of the local mill as far as July. We quote mill shipments, Chicago delivery, tank steel, ¼ inch and heavier, 1.75c to 2c base; flange steel, 1.85c to 2.10c. Price from stock, tank steel, ¼ inch and heavier, 2.25c to 2.35c; 3-16, 2.30c to 2.40c; No. 8, 2.40c to 2.50c; flange steel, 2.50c to 2.60c.

WIRE PRODUCTS.—There is no lessening in the demand for material of all kinds, jobbers everywhere stocking up for the spring trade. We quote prices to jobbers, carload lots, Chicago delivery, as follows: Smooth wire, annealed, 1.90c; galvanized, 2.20c; painted barb wire, 2.30c; wire nails, $2; cut nails, 2.15c; polished staples, 2.15c; galvanized staples, 2.45c. Prices to retailers are 5 cents higher than above quotations on carload orders, and 15 cents higher on less than carload lots.

COKE.—The shortage of coke continues to be pronounced and furnaces as well as foundries are suffering from its scarcity. Spot coke is sold at $10 to $10.50, and for forward deliveries $5 to $5.25 at the ovens is asked.

OLD MATERIAL.—A leading local producer of bar iron was in the market last week for a limited quantity of scrap iron, having decided to start up one of its idle mills. Outside of this one feature, the market is without interest. The following are selling prices per gross ton:

Old Iron Rails	$24 00 to 24 50
Old Steel Rails (mixed lengths)	18 00 to 18 50
Old Steel Rails (long lengths)	23 00 to 23 50
Relaying rails	31 50 to 32 00
Old wheels	22 50 to 23 00
Heavy melting steel	16 50 to 17 00
Mixed country steel	15 00 to 15 50

The following are selling prices per net ton:

No. 1 R. R. wrought	$19 00 to 19 50
No. 2 R. R. wrought	17 50 to 18 00
Shafting	19 50 to 20 00
Dealers' forge	16 00 to 16 50
No. 1 busheling	13 50 to 14 00
No. 1 Cast	16 50 to 17 00
Railway malleable	16 00 to 16 50
Country malleable	14 50 to 15 00
Iron axles	23 50 to 24 00
Steel axles	19 50 to 20 00
Cast borings	10 50 to 11 00
Wrought turnings	13 50 to 14 00
Iron axle turnings	14 50 to 15 00
Steel axle turnings	13 00 to 13 50
Stove plates	12 50 to 13 00
Old iron splice bars	21 00 to 21 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Dec. 31

The year closed with everybody in the iron and steel business in a happy, hopeful frame of mind. In spite of the anxiety caused during the latter half of the year by inadequate railroad facilities and by the apprehension that prices might go too high, the year has been one of the most profitable and satisfactory in the history of the trade. Perhaps no class of men have more reason for satisfaction than the jobbers, who have enjoyed great prosperity, although predictions that the day of the jobber was passing had been made frequently in the year or two preceding. There appears no reason for foreboding as to the new year. While some prices may be lower, a confident feeling prevails that healthy conditions will be the rule.

IRON ORE.—The statistics as to shipments of ore, receipts at Lake Erie docks and ore on docks Dec. 1 have caused some interesting discussion as to whether the immense output of the Lake Superior mines will prove to be much in excess of the demands of the furnaces. One experienced furnace superintendent who has several furnaces under his care is among those who believes that there will not be a large surplus on docks and in furnace yards May 1. He says that the fact that ore is now moving freely from the docks on demand of furnaces, although the weather is not favorable for shipments, shows that the ore on docks will be steadily decreased, and he expresses the opinion that by May 1 little more than 1,000,000 tons will be left on docks. This opinion is combatted by those who declare that present shipments from docks are to meet certain requirements in mixtures and do not show that stocks at furnaces are not large. The Pittsburg Steamship Co. has amicably adjusted a controversy with the marine engineers as to wages and there are no signs of labor troubles for next season.

COKE.—The snow which was very heavy in Cleveland did not extend to the coke regions last week and shipments were better than usual. Prices remain firm at $8 for spot and $5.25 for first half, Connellsville foundry coke. Evidence accumulates that these high prices will not be maintained and the same is true of furnace coke. It is reported that some consumers of the latter, in order to cover possible shortage, have made contracts with different independent companies in excess of their demands, and, if railroad facilities improve, will have a surplus to place on the market.

PIG IRON.—There is a distinctly better tone, but there is little change in prices. While the usually quoted price for spot iron is the same as last week's, on a basis of $24.75 for No. 1 Northern, small sales have been made somewhat higher. Official notice of advance of freight rates have not been received, but it is expected that the advance from the Ohio River to Cleveland will be from 15 to 20 cents and 10 cents from the Valley. Prompt No. 2 Southern is selling at $24.20, Cleveland, but quotations are seldom given at Cleveland prices, the practice being to quote $20 at the furnace, letting the buyer take the risk of advancing of freight rates. Southern No. 2 for forward delivery sells at $23.20, Cleveland. Northern gray forge is now very scarce and the price is about 50 cents higher than last week. For the latter half of the year prices are on a basis of $22.75, Cleveland, for No. 1 foundry and $21.75 for No. 2. We quote domestic iron as follows, f. o. b. Cleveland, for shipments in the first half of 1903:

Bessemer	$21 75 to 22 25
No. 1 Strong Foundry	23 00 to 23 50
No. 2 Strong Foundry	22 50 to 23 00
No. 3 Foundry	21 75 to 22 25
Scotch No. 1	23 00 to 23 50
Scotch No. 2	22 50 to 23 00
Gray Forge, Valley	20 50 to 21 00
Lake Superior Charcoal	27 50 to 28 00

FINISHED MATERIAL.—The market has been extremely quiet, but this is attributed to inventories being taken, as there are no signs of weakness. About the only noteworthy sale was 4,000 tons of sheet bars. The situation as to bar iron shows little change, the usual price being 1.70c, Pittsburg, for common, with some sales in carload lots being made at 1.75c to 1.80c. The price of steel bars, 1.60c for Bessemer and 1.70c for open-hearth, Pittsburg, is maintained. There is nothing new concerning plates and structural material. Those manufacturers of sheets who have attained a reputation for fighting for business seem to be impressed with the spirit of the reason of good will and peace and the cutting of price is not so noticeable. The price of the distributors of the product of the principal producer, are as follows: For 3-16-inch sheets and heavier, 2.10c to 2.15c, Cleveland. Mill sales of black sheets, Cleveland, to consumers: No. 24, 2.65c to 2.75c; No. 26, 2.75c to 2.85c; No. 27, 2.85c to 2.95c; and the following prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.50c to 2.60c; No. 16, 2.55c to 2.70c; Nos. 18-20, 2.75c to 2.90c; Nos. 22-24, 2.85c to 3c; Nos. 25-26, 2.95c to 3.10c; No. 27, 3.05c to 3.20c; No. 28, 3.15c to 3.30c. On galvanized sheets we quote mill sales in carload lots, Cleveland, as follows: Nos. 10 and 11, 2.60c to 2.75c; Nos. 12-14, 2.70c to 2.85c; Nos. 15-17, 2.80c to 2.95c; Nos. 18-21, 3c to 3.15c; Nos. 22-24, 3.30c to 3.45c; Nos. 25-26, 3.55c to 3.70c; No. 27, 3.80c to 3.95c; No. 28, 4.05c to 4.20c; No. 29, 4.45c to 4.60c; No. 30, 4.95c to 5.10c. Galvanized sheets out of stock are quoted 75 and 2½ off.

OLD MATERIAL.—Dullness and firm prices are still ruling in scrap. Complaints about the railroads are heard, one dealer who brings scrap from Illinois saying that cars had been delayed more than a month en route from cities in that state: We quote Cleveland prices, all gross tons, as follows:

Old iron rails	$25 50 to 26 50
Old steel rails (over 6 feet)	22 00 to 23 00
Old steel rails (6 feet and under)	21 00 to 22 00
Old car wheels	20 00 to 21 00
No. 1 R. R. wrought scrap	20 00 to 21 00

Mill scrap	19 50 to 20 00
No. 1 machine cast scrap	21 00 to 21 50
Iron axles	29 00 to 30 00
Steel axles	28 00 to 29 00
Axle turnings	18 50 to 19 50
Wrought turnings (free from cast)	16 00 to 17 00
Cast borings	11 00 to 12 00
Uncut wrought iron boilers	12 00 to 13 00
Steel boiler plates	17 00 to 18 00
Grate bars	12 00 to 13 00
Pipes and flues (clean)	17 50 to 18 50
Tank iron	17 00 to 18 00
Hoop and band iron	13 50 to 14 50
Sheet iron	12 00 to 13 00
Wrought drillings	15 50 to 16 50
Malleable iron (railroad)	20 50 to 21 50
Malleable iron (agricultural)	17 50 to 18 00
Stove plate	15 50 to 16 50
Heavy steel	19 00 to 20 00

CINCINNATI.

Dec. 30.

The iron market has shown more activity the past week. Coke continues firm with spot coke quotable at $7 to $7.50 at ovens. For contracts running into next year $5.50 to $6 at the ovens is the range for foundry coke. In finished material prices are steady and unchanged.

Pig Iron.—The market has been more active the past week. The tonnage of orders was not large, still compared with the two preceding weeks the sales show considerable gain. Transactions were mainly in spot iron and for January and February delivery, showing that buyers are still disposed to provide for their wants only temporarily. In spite of the fact that inquiry has been stronger there is a decidedly irregular market. While some furnace agents are maintaining prices, others make slight concessions to effect sales, and there is enough of this quiet shading of prices going on to establish slightly lower quotations. The lower grades of iron are particularly subject to irregularity. No. 4 foundry has been sold at $15.25 Birmingham, and gray forge at $15.50 with some talk of a $15 price having been quoted. For No. 2 foundry sales for spot delivery are at $19 and for first quarter of 1903, $18.50 to $18.75 Birmingham. The question of foreign iron, and its influence on the home market is engaging some attention. It is to be noted that foreign markets are weak and the withholding of American orders is prompting marked concessions abroad. Freight rates on pig iron from the Virginia furnaces on the C. & O. R. R. to points in the North and West will advance 50 cents Jan. 1, and from the Southern furnaces to points north of the Ohio river 10 to 20 cents per ton. We quote for quick delivery and first quarter of 1903, f. o. b. Cincinnati:

Southern Foundry No. 1	$22 25 to 22 75
Southern Foundry No. 2	21 75 to 22 25
Southern Foundry No. 3	20 75 to 21 25
Southern Foundry No. 4	18 50 to 19 00
Southern Foundry No. 1, soft	22 25 to 22 75
Southern Foundry No. 2, soft	21 75 to 22 25
Gray Forge	18 75 to 19 25
Northern Foundry No. 1	25 10 to 25 60
Northern Foundry No. 2	24 10 to 24 60
Southern car wheel iron	27 75 to 28 75

Finished Material.—While trade has been quiet the past week the tone of the market is good and prices are well maintained. The advance in freight rates will cause an advance of $1 per ton in some lines, but mainly only the increased cost of transportation will be added. Prices are steady, in fact some dealers refuse to meet current quotations. In merchant pipe the market is firm at the prices established by the leading interest. We quote black sheets No. 27 at 2.75c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 3.20c; No. 27, 3.10c; No. 16, 2.75c; No. 14, 2.65c; No. 12, 2.55c; No. 10, 2.45c. Galvanized sheets, car lots, sell at 75 and 10 percent off; less than car lots, 70 and 10 percent off. Tank plates out of store are quoted at 2.25c for ¼ inch and 2.35c for 3-16 inch. Prices for bar iron in carload lots are: 1.80c base, half extras f. o. b. Cincinnati; steel bars, 1.72c base, half extras f. o. b. Cincinnati. Both are retailed at 2c base, half extras, out of store. Beams and channels are selling 2½ to 2¾c. retail, and angles at 2.15c to 2.25c for base sizes. Merchant pipe and boiler types are quoted as follows for carload lots f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜-inch	66.8	56.8	63.8	53.8
½-inch	68.8	58.8	65.8	55.8
¾ to 6-inch, inclusive	73.8	63.8	70.8	60.8
7 to 12-inch, inclusive	71.8	61.8	68.8	58.8

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ in.	43.8 & 5	38.8 & 5
1¾ to 2½ in.	56.3 & 5	36.3 & 5
2¾ to 5 in.	61.3 & 5	46.3 & 5
6 to 13 in.	56.3 & 5	36.3 & 5

Old Material.—The market was quiet with an easy undertone. We quote:

Old No. 1 Wrought Railroad, net tons	$19 50 to 20 00
Cast Machine and Foundry, net tons	16 50 to 17 00
Old Iron Rails, gross tons	24 00 to 24 50
Old Steel Rails, gross tons	23 00 to 23 00
Old Short Lengths, gross tons	17 50 to 18 00
Old Iron Axles, net tons	26 00 to 27 00
Old Chilled Car Wheels, gross tons	21 50 to 22 00
Stove Plate, net tons	11 50 to 12 00
Wrought Turnings, net tons	15 00 to 15 50
Cast Borings, net tons	12 00 to 12 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
Room 1909, No. 150 Nassau St., Dec. 30.

Pig Iron.—The closing week of the year in the pig iron market in this vicinity found dullness the prevailing feature. Car lots for immediate use formed all the trading that was done, and the prices paid showed no falling off from those which have obtained for weeks, a sale of about 100 tons of Southern No. 2 foundry, soft, having been made at $25. Sales agents express themselves as pleased with the many inquiries they have been receiving lately for delivery the first six months of the year. The inquiries emanate from those who have not as yet made any provision for their requirements for that period. In several cases representatives of furnaces have replied that they cannot book any orders for delivery within four months at the earliest, and the tonnage they are willing to offer is extremely limited. Evidently buyers around here are placing their sole reliance in foreign irons, for such supplies as they will need during the next few months. At present the prices of foreign irons are very irregular, because of the changing character of ocean freights. The latter are now a little higher than they have been, due to the renewal of engaging steamers for bringing coal to this country from abroad, some twenty steamers having been chartered for this purpose recently. As a result the price of foreign irons depends largely on ocean freights. As these stand now, Middlesboro No. 3 can be purchased in cargo lots, New York delivery, duty paid, for prices ranging from $17 to $17.50. German irons figure quite largely in recent inquiries, with the question of analysis forming the foundation of them. Scotch brands seem to be losing much of the popularity they enjoyed in the earlier part of the year.

In American irons, the situation is without interest. Expectations of a quiet market for the next few weeks are expressed in many quarters. The belief in lower prices is as strong now as it ever was. Those whose opinions incline this way find considerable satisfaction in the bearish features that have dominated Wall St. speculation recently. The coke supply still continues inadequate, and $7.50 at the ovens is the ruling price. New York prices for 1903 are as follows: No. 1 X Northern, $23.25 to $24.75; No. 2 X, $22 to $22.75; No. 2 plain, $21 to $21.75; Southern No. 1 foundry, $23 to $23.50; No. 2 foundry, $22 to $22.50; No. 3 foundry, $21.50 to $22; No. 4 foundry, $20.50 to $21.

Billets.—German billets continue strong, and $27.50 to $28.50 for large lots, New York delivery, duty paid, is a quotation that can be relied upon. The holidays have had an enervating effect on actual sales recently, but inquiries are of the best.

Finished Iron and Steel.—As a whole, the finished material market during the week reflected the dullness always expected at the close of a year. The American Bridge Co. reports small orders coming in very satisfactorily, with several large orders impending. During the week this company booked an order from the St. Joseph & Grand Island Railroad, for 3,500 tons, to be used in the construction of a bridge across the Missouri River at St. Joseph. In plates, the greatest pressure is being brought on mills to make better deliveries by car-building interests. The mills are turning down business for the first six months of 1903, and as a general rule, we are reliably informed, the only orders that are desired now are those which call for delivery the last quarter of the year, with earlier shipment if conditions will permit. In bars better delivery of the smaller sizes is noted, but the larger sizes are not being shipped

to customers' satisfaction. Sheets continue to be characterized by features which have been enumerated in previous reports. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 2.10c to 2.15c; flange, 2.25c to 2.30c; fire box, 2.30c to 2.50c; refined iron bars, 1.95c to 2c; soft steel bars, 1.95c to 2.10c; steel sheets, in carloads, New York, No. 28, black, 3.05c to 3.15c; galvanized, 75 and 7½ off.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM NO 1909, 150 NASSAU ST., Dec. 30.

PIG TIN.—During the week manipulators took the market in hand, and succeeded in advancing prices considerably. The closing of the market today was the highest of the week, and by way of comparison with this time a week ago, spot is about 50 points higher, with futures sharing equally in the advances. The bullish aspect of the market is largely a matter of sentiment. There is nothing in the way of increased consumption or decreased production to warrant recent advances. Closing prices today at the Metal Exchange were as follows: Spot to February, 26½ to 26¾c; March, 26½ to 26.65c; April, 26.40c to 26.65c; May, 26.30c to 26.65c. London closing prices today follow: Spot, £120 15s; futures, £121 12s 6d. Arrivals at Atlantic ports to date amount to 2,892 tons, with 2,090 tons afloat. Deliveries for the month aggregate 2,600 tons.

COPPER.—The quiet feeling noted in previous reports, again took possession of the copper market during the past week. Consumers are still confining their operations to buying only to meet immediate wants, and the feeling among them that lower prices will eventually ensue, is strengthening rather than declining in intensity. Prices in the local market remain nominal, and as such are a little stiffer than those which were quoted a week ago, with no valid reason being discernible. The London market during the week has been dull, but prices for both spot and futures are higher than at our last report. Conner houses with foreign connections are in receipt of letters, which take a rather gloomy view of the outlook for consumption abroad, particularly in the shipbuilding and engineering lines, in both of which a recession in activity is noted. Today's closing prices at the Metal Exchange were as follows: Lake, 11⅝c to 11¾c; electrolytic, 11½c to 11¾c; casting, 11¼c to 11.67½c; standard, 11c nominal. The London market closed today as follows: Spot, £52 6s 3d; futures, £52 13s 9d. The exports for the month to date aggregate 8,936 tons.

PIG LEAD.—Lots of 50 tons or more are still obtainable at 4.12½c. The St. Louis market remains unchanged at 3.95c to 3.97½c. London has advanced slightly, and is now quoted at £10 17s 6d.

SPELTER.—Weakness was again in evidence during the week, and spot declined another 10 points from our last quotation, being offered now at 4.70c, with buying extremely limited. January and February is quoted at 4.62½c. The St. Louis market was weak also, and prices are some 10 points lower. London remains unchanged at £19 17s 6d.

ANTIMONY.—All brands continue easy, with Cookson's at 8½c to 8¾c, Hallett's, 7⅞c to 7⅜c, and other brands at 6¾c to 7c.

NICKEL.—Unchanged. Prices average 40c to 60c, according to quantity.

QUICKSILVER.—Jobbers only are in the market, and sales have been made on the basis of $48 per flask in lots of 100 flasks. London, £8 15s.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, Dec. 30.

Buying of metals has slightly improved during the week under review, but consumers are taking only enough stocks to tide them over the inventory period. Both copper and spelter are firmer. We quote jobbers' prices as follows:

Lake copper, carload lots, 11½c; less than carload lots, 11¾c to 12c. Pig tin, 27¼c; pig lead, carload lots, 4.05c to 4.07½c; less than carload lots, 4.10c. Sheet zinc, carload lots 6¼c, and 6⅜c in lots of 600 pounds. Spelter, carload lots, 4.05c; less than carload lots, 5c to 6c. Antimony, 10¾c to 11c for Cookson's, and 9¾c for Hallett's in small quantities. Nickel, 5c to 6c, according to size of order and delivery. Demand for old metals is slightly better, though prices are unsteady. Selling prices of dealers are as follows: Copper wire, $10.25; heavy copper, $10.25; light copper, $9.25; red brass, $10.25; yellow brass, $7.75; light brass, $6.50; lead pipe, $3.90; zinc, $3.75.

TERMS OF THE UNION STEEL CO. DEAL.

(Special Telegram.)

PITTSBURG, Dec. 31.—A circular letter has been received by the stockholders of the Sharon Steel Co., of Sharon, Pa., signed by the officials of that company, which fully outlines the negotiations leading to the consolidation with the Union Steel Co., of Pittsburg, and later the absorption of the two companies by the United States Steel Corporation. Stockholders are requested to deposit their shares with the Union Trust Co., of Pittsburg, no later than Jan. 8. The circular shows that the Sharon cash investment was $11,000,000, exclusive of the iron ore properties which cost the company $200,000, and which its officers valued at $5,000,000. The capital of the company is $6,000,000 while bonds aggregating nearly $3,600,000 are outstanding. The floating indebtedness is about $1,500,000.

According to the deal entered into with the Union Steel Co. the stockholders of the Sharon interests were to receive $13,500,000 in stock in the new Union Steel Co., provided, of course, all the stock could be turned over and that the books showed investments commensurate with this amount of stock. The absorption of the two companies by the United States Steel Corporation somewhat altered these conditions, and according to an audit completed on Dec. 22 the Sharon stockholders are to receive $12,887,000 in bonds of the Union Steel Co., the United States Steel Corporation guaranteeing $45,000,000 worth of bonds of the Union company in payment of these two properties. It is further provided in the agreement by which the United States Steel Corporation takes over these properties that the original agreement between the Union and Sharon steel companies shall be carried out and that the Union Steel Co. shall operate as a constituent company of the corporation.

For Sharon stock of the value of $1,000, approximately two $1,000 bonds and scrip redeemable in bonds to the amount of $100 will be issued. The bonds of the Union Steel Co., referred to, are part of a total issue of $45,000,000 to be made by said company of 50 year 5 percent gold bonds, free of tax, to be secured by a first mortgage and collateral trust deed to the New York Security & Trust Co., of New York, as trustees, covering the property and franchises of the company, including the shares of stock of the Sharon company acquired by it. The mortgage will also contain provisions requiring the Union Steel Co. to pay 2 percent per annum on the total amount of bonds outstanding into a sinking fund for the further security of the bonds, and the bonds are to be redeemable after Dec. 1, 1907, at 110 and accrued interest.

All of said bonds not required for the properties acquired by Union can be used only for the acquisition of additional properties by the Union company or the making of improvemenst upon its own properties. Payment of the principal and interest of all of said bonds is to be guaranteed by the United States Steel Corporation.

Good Growth of the N. M. T. A.

The National Metal Trades Association sends out on Jan. 1 the largest list of names of applicants for membership ever submitted on a single ballot. The applicants are from all parts of the country. The association is making rapid growth and the membership is nearing the 300 mark. The monthly *Bulletin* has now taken the form of a regular magazine devoted to the interest of employers of labor, with a subscription price of $1 per year. Secretary Robert Wuest, of Cincinnati, reports the affairs of the association in the most flourishing condition.

The Beaver Falls Enamel Works, which have been shut down for several months on account of financial trouble, will start in a few days.

THE IRON TRADE REVIEW

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JANUARY 1, 1903

The Index to Vol. XXXV of *The Iron Trade Review*, covering the year 1902, will be ready in the coming week and will be sent to all subscribers who ask for it.

The growth of *The Iron Trade Review* in 1902 has been marked. From an average of 64 pages a week one year ago, there is now a weekly average of 100 pages of reading matter and advertising. The policy that has been steadily pursued, of making a paper that manufacturers in the iron and steel and machinery trades would value sufficiently to subscribe for and pay for, is recognized by our patrons as the only foundation for standing and permanence. Occasionally a seeming success attends the efforts of trade publications whose reading columns are made for advertisers. But the free circulation of such papers would indicate that the public's and the publisher's valuations of them agree. At large outlay of labor and money *The Iron Trade Review* has sought to make itself a trade necessity. The record of additions to its subscription list in the past year would indicate a fair measure of success in that direction.

The review, in another column, of the Lake Superior ore situation as affected by the developments of the past year, presents considerations of prime importance to the entire iron trade. Lake iron mines have had a marked increase in value in the past year, and the more so as the dependence of the United States Steel Corporation for maintaining dividends over a term of years must be in large control of the sources of ore supply. The dispatches of the week have announced the purchase of the extensive Hill mines by the corporation. While the report is not confirmed, such acquisition would seem to be entirely in harmony with the trend of recent events in the iron trade. Ore developments of 1903, moreover, will bear close watching.

LARGE INCREASE IN IMPORTS OF PIG IRON.

In the report of the Treasury Department for October, there were indications that the imports of pig iron had reached theri highest amount, for the shipments which steadily increased from 7,633 tons in January to 82,196 tons in September, declined to 67,204 tons in October. It appears, however, from the report for November that this hope was not well founded, for the imports in November were the highest of the year, passing the 100,000-ton mark by 400 tons, an increase of 33,196 tons, or nearly 50 percent over October. The imports of steel show a decrease of 4,352 tons as compared with October, but they are almost the same as in September and are about up to the average for the preceding six months. The following table shows the pig iron and steel imports since Jan. 1. The column of steel includes ingots, blooms, slabs, billets and bars of steel and steel "not elsewhere specified," structural steel being thus included:

IMPORTS OF PIG IRON AND STEEL—GROSS TONS.

	Pig Iron.	Steel.
January	7,633	5,312
February	8,007	2,235
March	18,184	6,570
April	19,067	13,005
May	30,508	24,388
June	32,258	35,588
July	62,106	36,124
August	79,447	39,027
September	82,196	27,726
October	67,204	32,036
November	100,400	27,684
	507,010	249,695

The imports of rails have decreased from 14,365 tons in October to 8,107 tons in November. Those of tin and terne plates have increased from 306 tons in October to 4,087 tons in November. The following table gives in detail the imports for November and for the eleven months ending with November:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	November.		11 mos. end'g Nov.	
	1901.	1902.	1901.	1902.
Pig iron	13,953	100,400	53,289	507,010
Scrap	2,585	10,502	19,039	97,361
Bar iron	2,144	2,478	19,313	25,508
Iron and steel rails	403	8,107	1,488	57,495
Hoop, band or scroll	128	38	2,969	3,231
Steel ingots, slabs, billets or bars	522	27,684	7,135	249,695
Sheets and plates	677	971	4,998	6,134
Tin and terne plates	7,182	4,087	67,102	51,264
Wire rods	935	1,915	15,310	17,607
Wire and wire articles	491	370	3,852	3,172
Total	29,010	156,552	194,374	1,017,353

The total value of iron and steel imports for November was $4,779,093 against $1,918,485 in November, 1901. For eleven months the total was $36,766,961 against $18,267,862 to the end of November, 1901. Iron ore imports in November were 65,494 tons against 79,790 for the same months of 1091. For eleven months, the figures are 1,063,025 in 1902 and 887,337 in 1901.

Exports for November were 8,592 tons less than for October, 1902, and 25,009 tons less than for November, 1901. The losses as compared with October, 1902, were due principally to wire rods, steel bars, steel rails, structural material and wire, while small gains were made on pig iron, scrap, bar iron and steel sheets and plates. For the eleven months the values were: For 1902, $90,136,024; for 1901, $90,136,024. For November, the total was $8,119,274 in 1902 and $8,201,008 in 1901. The following table shows exports in detail:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	November.		11 mos. end'g Nov.	
	1901.	1902.	1901.	1902.
Pig iron	18,039	1,703	75,810	26,277
Scrap	1,047	868	13,598	9,040
Bar iron	673	252	17,069	19,199
Wire rods	164	295	6,173	21,108
Steel bars (not wire rods)	1,982	449	24,636	8,708
Iron rails	0	0	901	210
Steel rails	16,852	1,588	302,232	66,854
Billets, ingots and blooms	90	220	27,286	2,409
Hoop, band and scroll iron	27	76	1,214	1,550
Iron sheets and plates	438	118	6,419	3,236
Steel sheets and plates	420	1,680	22,540	13,989
Tin plates, terne plates and taggers' tin	2	103	429	1,531
Structural material	4,822	1,993	49,089	51,776
Wire	8,955	7,593	79,333	91,584
Cut nails	377	621	6,738	6,742
Wire nails	602	1,799	17,135	24,145
Other nails, including tacks	131	356	1,706	1,896
Total	54,621	19,614	664,908	1,081,637

Manufacturers' Opinions on the Outlook Based on Orders and Projected Extensions.

The prospect for a continuance of present prosperity in machinery and metal working lines is canvassed with unusual interest at the close of a year of such crowded operations as have marked 1902. That the frictions of the past year—the delays of much needed material and the congestion of work in shops that had undertaken more than they could deliver in the specified time—will not be repeated in 1903, seems likely. Over this there will be satisfaction on all hands. But there is nothing in the situation today to indicate that the tide of good times that has swept so strongly over the metal working industries in the past year, is to be turned back. Substantial evidence of continued full operation in widely diverse lines is contained in the replies below to letters of inquiry sent out by *The Iron Trade Review*. These contained the following questions:

1. What are the prospects for 1903 in your business, and on what are these based?
2. Are further extensions planned in your own business or in lines that buy from you?
3. Is an increase in your foreign trade to be expected, and are any steps desirable for the enlargement of foreign business?
4. Have you any suggestions for the continuance or improvement of present industrial conditions, and are there any untoward symptoms?

BULLOCK ELECTRIC MFG. CO., CINCINNATI.

The prospects are favorable for even a larger year of business than during 1902. We base this prediction upon the inquiry for quotations on large apparatus to be built within the next year. We have plans drawn for extending our present machine shop, No. 3, 900 feet. This building is at the present time 177 feet wide and 300 feet long. We expect a very large increase in our foreign trade the coming year. The most desirable improvements in connection with foreign trade would probably be along the lines of banking and transportation. The one suggestion we could offer for the continuance of the present "good times" is to continue the Republican party in power. We feel certain that if there is a change in administration, there will be a change in our prosperity, if for no other reason than the uncertainty which accompanies a change in the government of a country. It is hard to predict what effect the changes in the tariff may have upon general prosperity of the country, and it is our opinion that this matter should be handled with great caution.

LODGE & SHIPLEY MACHINE TOOL CO., CINCINNATI.

Prospects for 1903 are good, as indicated by the business that we know will be placed. We recently doubled our floor space. We do not contemplate further extensions in the near future. We know of many other contemplated extensions. We do not look for a substantial increase of the foreign trade the coming year, but are constantly cultivating it. The recent and existing conservative influences which have been at work throughout the country, we think have a distinct tendency to continue the era of prosperity, and barring any calamity beyond the control of men, we see no reason why we should not continue to have prosperity with us for a long time to come.

Fears a Coming Labor Conflict.

C. O. BARTLETT & SNOW CO., CLEVELAND.

Comparing our business with last year we find that the increase will not be less than 25 percent. We find it difficult, however, to keep the selling price up in proportion to the cost price. We are paying at least 25 percent more for iron and steel than we did a year ago. Castings are costing us from not less than $60 to $80 a ton. Finished steel is costing much more than it did a year ago but not in proportion to the castings. The inquiries are numerous especially for labor saving machinery. There seems to be very many new enterprises undertaken in all the different lines of our manufacture, especially in the use of sand, clay, ores, etc. One of our specialties is machinery for drying coal, clay, sand, stones, etc., to be used in the manufacture of Portland cement. In this particular instance there has been a wonderful increase. New mills are being started up in many places and old mills are increasing their capacity. In fact, it is a sort of a cement age. It almost looks as though cement would be a hard competitor to iron. Whole buildings, to say nothing of bridges, culverts and railroad work and street work, sewers, etc., are being constructed of cement. Also very large amounts of artificial stone are used. It really looks as though artificial stone could be made better than the natural stone, a better and lasting quality and not very expensive.

We have suffered some in the milling machinery business on account of high prices. Millers cannot stand the heavy advance in prices. The same danger, the strike, is still a serious one to all the manufacturers and more than ever at the present time. The unions are well organized. The manufacturers are getting well organized and undoubtedly there will be a crash in the near future. Just how long the fight can be put off no one can state, but that it is coming is generally conceded by nearly every manufacturer. We dread to predict what the result will be, but there must be an end to high prices. The apex must soon be reached and the decline will follow.

With what orders we now have on hand and from the important inquiries we are getting there is good reason to believe that we will be busy for some time.

STRAIGHT LINE ENGINE CO., SYRACUSE.

We have every reason to believe our business for the next year will be as good as at present, which means all we can do. This is based on the fact that our best customer offers to give us all the foundry work we can do, and our inquiries for engines are as numerous as ever. We do not plan to extend our plant, but our customers are constantly expanding. We no longer do or care for any foreign trade. It would seem that trade is in such condition as to make it satisfactory to the great majority, but it was not so long ago that we have forgotten when we had about as satisfactory conditions as at present, and people enough to carry the election thought we had too much money in the treasury and that it was time to have a change. So we had a change. People found they could buy things cheaper and also found they had no work and no money to buy with. There is a shadow of growing symptoms that that experience may be repeated.

HILLES & JONES CO., WILMINGTON, DEL.

The prospects for 1903, or at least the first half of it, are very bright for a continuation of the conditions of the year now ending.

VILTER MFG. CO., MILWAUKEE.

The business outlook in our line of manufactures is particularly bright for the year 1903. Our business has been steadily increasing for the last six years, and from our present observations would conclude that the output will be larger than ever next year. This we are led to believe from present indications, based on the number of inquiries we are receiving and have been receiving for a number of months. We have also been exceedingly busy making out estimates for machinery which will be contracted for shortly and to be installed the first of next year. However it is difficult for us to say at this time whether the present great demand for machinery in our line will continue throughout the year. We have been doing considerable foreign business in the last few years, and see no reason why we should not expect to receive a good share during the coming year.

JONES & LAMSON MACHINE CO., SPRINGFIELD, VT.

We see no indications for change of business conditions for 1903. This company has just completed new buildings which, when fully occupied, should more than double our

output. We expect a continuation of our present fair volume of foreign business.

Let Well Enough Alone.

JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.

The consumer, which means everyone, is everywhere prosperous. The wage earner is receiving large and larger wages. The farmer is rich from abundant crops and famous prices, and this, plus the fact that the American people are good spenders, seems to warrant good prospects for 1903 at least. The Dixon company accomplished additions of large new buildings in 1902 and has more to do in that way yet. Our aim is an up-to-date plant. Of course, increase in foreign lines is to be expected. Read Brooks Adams' recent book on the "American Economic Ascendency" for convincing reasons too numerous to recapitulate here.

Suggestions are legion. In a word, progress, growth and ascendency like everything else, has its price. It means better goods, lower cost of production, more energy. Pay the price, and the result is yours. The chief economic menace of the United States today is our imperfect inelastic currency. For government policy, we should say, let the tariff alone, and also let the so-called trusts alone. These latter big business combinations are the results of a law whose working is as inevitable as the law of gravitation. Furthermore, they are our greatest pride and have given us more renown the world over, in the last five years, than we obtained before in any 50 years.

CINCINNATI MILLING MACHINE CO., CINCINNATI.

As far as we can judge the prospects for 1903, they are very promising for the machine tool trade. We believe there have been more machine tools manufactured in the year now closing than in any previous one year and the demand at the end of the year is as strong as ever. The business has branched out into various lines and it is very general in its character. This and the crowded condition of the machine shops throughout the land and the general prospects of the country, as indicated by the tremendous business handled by the railroads, all give every promise that the conditions in the domestic market will continue as they are now for the coming year.

In the foreign trade we are noticing a steady improvement and we believe that the conditions, particularly in Europe, will be further improved during the coming year. A careful study of the needs of the foreign trade and a conscientious attention to those wants will be helpful in an enlargement of this trade for the American manufacturer.

We believe we have reached the high water mark in the cost of materials and the increased facilities that have been under way; prices are not likely to go higher—rather tend to a lower and more normal basis. Labor, however, continues very scarce and with the large demand the tendency will be rather to a higher than to a lower basis.

The Currency Question Important.

WEBSTER, CAMP & LANE CO., AKRON, O.

The year opens with us with a larger number of contracts on our books than ever before, being practically filled up for the first half of the year, and with orders which will occupy certain departments very nearly the whole year. We are just about completing the removal into our complete new works, recently built, but the pressure upon us is such that we shall be obliged to operate the old plant as well as the new. There are certain lines of our business that we have not been able to exploit to the fullest extent, owing to the demand in lines already established.

In regard to foreign trade: While we have done considerable business with foreign countries in the special line of mining machinery, we have not been able to follow this up and push it in any great degree on account of the continued pressing demand from local markets. We are still having considerable foreign inquiry and prospects are good for a large amount of foreign trade. The foreign buyers are greatly interested in American time-saving and cost-reducing machinery; and while there is a considerable tendency on the part of the Germans, as well as others, to copy our American machinery, there is still a large amount of business for us in this direction if properly followed up.

While there has seemed to be quite a general opinion that we have reached the crest of this wave of prosperity, the prospects are very good for a large business throughout 1903, unless financial conditions should become more unfavorable than at the present time. The tightness of the money market is doing more, we believe, at the present time to obstruct trade than any other one cause, although this may have its advantages, inasmuch as it tends to check over-speculation and to impart steadiness to the whole line of business. While the demands of labor have been very exacting, and if pressed further or in unreasonable lines would tend to obstruct and cripple trade, we believe that wages have advanced in proportion to the cost of living and that manufacturers as a rule are disposed to allow to labor its fair share of the increase, and that as a rule further unreasonable demands will not be made for wages and shorter hours which are beyond what it is possible to allow. What the business of this country needs more than any other one thing at the present time, in our opinion, is wisely enacted laws governing the supply of money, so that the volume of currency in circulation may expand and contract in a great measure with the volume of business, rather than inversely as it now does.

WATSON-STILLMAN CO., NEW YORK.

We believe that unless labor agitators succeed in more unnecessary deviltry, we have ahead of us several years of good business; but the whole of it can be upset by unnecessary and unjust demands which can only result in general uncertainty. One of the best informed men on structural work told the writer within a few weeks that railroads alone would spend on new bridges throughout this country $250,000,000 a year for ten years. The age of many of the present bridges and the increased weight of the equipment which passes over them practically requires a renewal of all railroad bridges within ten years. On every hand we hear of improvements laid out, costing a great deal of money, which are necessary for the economical turning out of goods of heavy weight, upon which it has not always been necessary to figure as closely as at the present time in making a fair profit. I believe that this applies in many lines of business. On foreign trade we do not know what the probabilities are. Our work is so largely special that we make very little effort to obtain foreign work.

R. D. NUTTALL CO., PITTSBURG, PA.

We will say that in a general way the prospects in our line of business are very good for the coming year. We have no special extensions in view but are constantly adding to our equipment as the demands upon us require.

AMERICAN TOOL WORKS CO., CINCINNATI.

As to the prospects for the coming year in our business we look for a continuance of the past year's healthy condition. We believe there will be a continued increase in the demand for machine tools due to the constant installations of new equipment on a more or less extensive scale, in the shops of both the steam and electric roads, exceptional spread of the latter, the rapidly increasing demand for machine tools from the automobile field, etc. This, we believe, applies to the machine tool outlook in general. The cramped conditions at present existing in our plant will make extensive additions imperative. We also expect to enlarge our facilities so as to be able to build and handle easily much larger tools than we have heretofore been building. We look for a decided increase in demands for machinery from foreign customers on account of the stronger and healthier tone of present increase from abroad than in the past. Labor and material have been constantly going up and we confidently expect another increase soon after the first of the year. This may have a natural reflection on the prices of the finished product.

WYCKOFF, SEAMANS & BENEDICT, NEW YORK.

We are looking forward to an increased amount of business in the year of 1903, and have already under way an addition to our factory which will practically double its capacity. We are constantly opening, both at home and abroad, new branch offices, and are always striving to

widen the scope of usefulness for the typewriter. We look for a continuation for some years to come of the present industrial conditions in the home market, and believe nothing of serious moment will occur in the near future to mar our business relations in the foreign field. In the last few years the cost of production has materially increased, due to increased cost both of raw materials and labor. We believe there will be a general cheapening of materials when the supply becomes equal to the demand.

BROWN & SHARPE MFG. CO., PROVIDENCE, R. I.

We see no immediate abatement of the prosperity of 1902, nor do we look for any early in the coming year. We are in a position to cater more fully to the wants of our customers in the future than in the past, not only in the machinery business, but in our foundry department, where we have greatly enlarged during the past year.

Good Outlook for Increased Activity.

BECKER-BRAINARD MILLING MACHINE CO., HYDE PARK, MASS.

We believe the outlook for the coming year to be a good one and we hope for increased business in our special line, owing to the new machines which we have recently brought out. We base our belief on the fact that most all the large manufacturers and larger industries are very busily employed, and probably have enough to carry them through the coming year. We have no further extensions planned in our business, only those which we are continually making in the way of improving our machines, and making necessary additions for the extension of the business. We see no reason why we should not expect an increase in the foreign trade. We have already felt a slight improvement and believe it should be better the coming year. The German business has not as yet revived, but we believe it should show signs for the better along toward the latter part of 1903. The year just closed has been a very good one with us and we hope to have same continue.

SPRAGUE ELECTRIC CO., NEW YORK.

The prospects for business in 1903, so far as our company is concerned are exceedingly bright. This past year has been the largest year our company has had. Business is constantly increasing and the outlook for next year appears to be most excellent.

Continued Large Expenditures for Better Efficiency.

LANE & BODLEY CO., CINCINNATI.

The prospects for our business in 1903 are good. These prospects are based upon the fact that our business depends upon new enterprises, extensions and improvements, and there is nothing in sight to prevent a continuation of such work. There is scarcely any limit to the possibility of improvement. The replacing of an old low building by a modern high building is profitable. The abandonment of antiquated, dark and inconvenient manufactories, and the building of new, light and convenient manufactories is profitable. The abandonment of old, unreliable, uneconomical engines, and the substitution of new, reliable and economical engines is profitable. The abandonment of old, inefficient, machine tools and woodworking machinery, and the substitution of new and efficient machinery, is profitable, and as long as this is so and there is nothing to alarm capital, it will continue to be invested, turning itself over and over and find its way into better homes, furnishings, vehicles, clothing, travel and luxury. We are engine builders and every one of these benefits the engine trade.

Further extensions are being planned for our own business. We have a tract of 22 acres upon which we now have laid one mile of joint railroad sidings and have up the steel work for the first building. The building is 130x300 feet of foundry proper, in addition to which we have in progress an engine and boiler house, casting cleaning house, wood shop and pattern storage warehouse. Our optimistic view of the future is based very largely upon the demand we find in our own business for continued expenditure for improvements. We have concluded it will be profitable to abandon practically everything we are now using—land, buildings, railroad tracks, engines, boilers and machine tools. We abandon belt transmission and increase the volume of business for others by the adoption of electrical transmission and so on all along the line. The field is so large in which there is profit in expending money for something better, that we believe the outlook is good for any one who is producing and selling under proper economic conditions those better things.

We have never made a strong effort for foreign trade. Our present facilities have been fully taxed at home. In our new and enlarged plant we shall possibly find it necessary to seek a wider field.

Our suggestion for the continuance and improvement of present industrial conditions is that prices all along the line, raw material and finished product, remain moderate.

GOULD & EBERHARDT, NEWARK, N. J.

Prospects for business in 1903 appear to us to be very good, especially for the first half of the year. Our opinion is based on the large number of orders we are receiving, and also on the large number of inquiries which come in daily, for machines to be delivered during the ensuing year, into works which are now under way or contemplated. We do not expect to enlarge our own works, but have been compelled to purchase additional equipment to meet the present conditions. From all the information we can glean, the outlook for business in our line from Europe is not very bright; however, business in Great Britain is much better now than it has been for some time, and we have received quite a few large orders from Canada. We have been so busy with our increased demand for shapers, drill presses and gear cutting machines that we have not had much of an opportunity to think over the continuance of industrial conditions, nor to notice the symptoms. We should judge, however, that the business conditions for the coming year will be good for both the employer and the employed.

MORGAN CONSTRUCTION CO., WORCESTER, MASS.

We believe the prospects for business in 1903 are excellent and we expect to have a very busy year. We have established an office in London and look forward to a substantial increase in our foreign trade. The present attitude of labor organizations and the high prices at which raw material continues to be held are the principal signs we see at present foreboding a change from favorable conditions.

H. K. PORTER CO., PITTSBURG.

Prospects for 1903 are excellent, based on orders now in hand and the whole general outlook. We are increasing our facilities by a large addition to our foundry, and the erection of a new boiler shop, and by the purchase of much new machinery. An increase in foreign trade is not to be expected while the present home demand continues so large. The principal steps desirable for foreign business are two: first, the encouragement of the merchant marine in every proper way, always based on the vast importance of this for the general good; and second, the settlement of the whole currency question, and the relation of the general government to the banking interests of the country, so that natural laws can have free course in finance, and that business interests may not be subject to artificial control.

BROWN HOISTING MACHINERY CO., CLEVELAND.

The prospects for 1903 in our business are good. We have approximately eight months' work on hand, and there seems to be still quite a demand for our varied line of product, caused by the proposed enlargement of present blast furnaces or the building of new ones and the enlargement and changes of dock facilities. There seem to be also some indications of extensions in lines that buy from us. We have no suggestions to make for the continuance of the present industrial conditions, and do not see any untoward symptoms except the stringency in the money market, which seemingly will have a tendency to check investment of capital, and thus probably retard improvements to existing plants and the inauguration of new ones.

ACME MACHINERY CO., CLEVELAND.

We think the prospects are good and base our belief on the number of orders in hand and the number of inquiries

coming daily. With regard to our own extensions, we shall answer "No," excepting perhaps the adding of here and there a machine tool where it is necessary. We cannot answer the question concerning the lines that buy from us excepting to say that all the machinery we sell practically goes to extend the business of the customers that buy from us.

We have come to expect an increase of our business in every locality where we begin to do business. In no market where our tools have ever succeeded in effecting an entrance have they failed to increase our sales in that market. Concerning the steps necessary to enlarge foreign business, we do not know of any better steps to take than those that have won out in all time and that is to make the best goods made on earth by anybody and to sell them at the least price consistent with the production of a good article and a fair profit on it. The writer has made quite a careful study during several trips to Europe of the methods of production in European countries, and if he were to sum up in a single phrase his impressions of what they can teach us it would be, "To be sure and do our work well." Not because these foreign countries do their work any better than we do, but because they are very critical of American manufactures, the utility and beauty of our machines they do not attempt to deny, they only hope that they will not stand the test of severe use.

We think the article in the North American Review written by the late Thos. B. Reed contains more common sense concerning our present industrial condition than anything else we have ever seen, especially where he says, "What would you say was the ideal industrial condition? Everybody at work. Now we have everybody at work and yet we think we want something else, if we keep on fussing we shall get it. We are doing more than well and need not hunt for disaster, that will come in due time." As to any untoward symptoms, we surely do not know of any except the old diseases of human selfishness. We do not know of anything that can stop our prosperity just as long as everybody is willing that the other fellow should have some of the prosperity as well as himself. It would be laughable if it were not so sad to read of the howl that goes up in the Eastern part of the country because they have to pay a little more for meat, entirely forgetting that the farmer has to pay more for his barb wire, farming tools and all the things that the East sells to him. So far as prices of commodities generally are concerned, we are quite apt to compare present prices with those that ob- to compare present prices with those that obtained at tained at some past time when such prices were unproductive of profit.

BILLINGS & SPENCER CO., HARTFORD, CONN.

We consider the prospect for business in 1903 good. To your second inquiry we reply, yes. We expect an increase in our foreign trade which is beginning to assume a satisfactory condition.

HERRING-HALL-MARVIN SAFE CO., HAMILTON, O.

We regard the prospects for 1903, as pertaining to safe interests, as exceptionally good. These prospects are based upon the fact that trade as a whole, irrespective of any particular line, is likewise in a good condition. As to an extension of business in our line, we are always aiming at an increased quantity. An increase quantity following, we naturally cater thereto by broadening out our wants, which condition would naturally affect those from whom we buy. Our foreign trade of today is triple what it was two years since, and the prospects are for an increased quantity during the coming year. We have nothing to suggest in a general way as to future improvements and we expect no adverse symptoms, except a possible continuation of the present tight money market for a limited period. This, however, should be materially and favorably affected after the first of the new year, by the receipt or payment of the enormous sums of dividends on all classes of stock. We find considerable difficulty in supplying ourselves with an ample quantity of mechanical labor adaptable to our product. Deliveries of material by the mills are very slow, thereby causing embarrassment and delay in completing the work to which the said material applies.

GEOMETRIC DRILL CO., WESTVILLE, CONN.

So far as our business is concerned, the prospects have never been brighter, and the indications are that our next year's business will far exceed any previous year. This opinion is based on the fact that we now have orders in hand for future delivery that will require nearly six months to execute, while orders for prompt delivery are in greater numbers and for much larger quantities than ever before, and the increasing number of inquiries which we are receiving daily are "straws" to which we attach much faith. We are now fitting up a new office building in which will be located our general and private offices, drawing room and shipping departments, and we now expect to occupy our new quarters about the first of the year. The old offices, drawing room and shipping department now occupied will be added to our main factory in order to secure the necessary room in which to set up the new machinery we are now installing. We also contemplate the erection of a new stock room in the near future.

We are enjoying a very satisfactory foreign business, and this like our domestic trade is also increasing but not in the same proportions, yet we have several projects on foot at the present time for increasing our foreign trade all of which promise well for the coming year.

Concerning the matter of a continuance or improvement of present industrial conditions: this problem is a most difficult one and to discuss it fully would require more time and thought than we could conveniently give it. There are certainly several disturbing influences at work which, if not checked, must, it seems to us, very seriously affect our industrial conditions in the near future; but we firmly believe that these matters are being adjusted as rapidly as possible by our legislators and the financiers of the country, and we consequently see no occasion for undue alarm.

MESTA MACHINE CO., PITTSBURG.

The prospects for 1903 are very good. We have a large amount of work on our books at the present time, quite a number of inquiries, and know of a lot of new business that will come up in our line that will keep up running in full during the entire year. We have just purchased property of the Walker plant of the American Bridge Co., adjoining our property, consisting of about nine acres, but have not decided yet to what extent we will make improvements on same during the coming year. We have no foreign business, and are not soliciting any at the present time.

Labor Agitators and Politicians.

CROCKER-WHEELER CO., AMPERE, N. J.

Our prospects for business for 1903 are extremely good, based on the continually increasing demand for electrical apparatus of good quality. We are planning extensive increases in our own business and find that the activity and rate of increase in other establishments that buy from us is phenominally large. There is a prospect for the usual increase in foreign business, but we do not consider it as great as the increase in domestic business for a number of reasons. To make a great increase in foreign business it would be desirable to remove the tariff from material.

Among things to be desired are an improvement in the monetary system and the removal as rapidly as possible of government functions from the realm of politics, so that public work may be carried on by the most competent people under civil service conditions, and the continuity of such work be undisturbed by the changes every year or two resulting from elections. We regard the tendency for good working men to be misled by irresponsible labor agitators whose object is to make something for themselves to do, and the tendency of those in charge of public affairs to avoid the loss to themselves of the labor vote by hedging when industrial and labor problems come up to them for action, as "untoward symptoms in the present industrial conditions."

THE WM. TOD CO., YOUNGSTOWN, O.

We consider the prospects for the new year in our line

to be very good, basing our opinion on the fact that we have on our books today enough orders to carry us well into the year (working double turn with entire force), and that we have a good many outstanding propositions and are receiving a good many inquiries. While we do not expect to secure all of this business, we hope for our share of it. We do not contemplate any extensive addition to our own plant in the coming year as we expect to realize the benefit of the extensions we are just completing, which we estimate will increase our capacity over 100 percent. We have exported in the last year, chiefly to Mexico and Canada, about $150,000 worth of engines, and have on our books orders for considerable work for delivery in 1903, and we feel that we may reasonably expect an increase in this trade.

NATIONAL CASH REGISTER CO., DAYTON, O.

Judging by the past, which is our only method of determining the future, we believe that our prospects for 1903 are of the best. Our business has increased steadily and consistently for a number of years. We plan further extensions along the line of progress we have been following. Our foreign trade is increasing steadily.

AMERICAN MACHINE CO., CLEVELAND.

We have no fixed line of business, but depend upon securing from others their overflow or excess work. So far as we can judge, we will have plenty to do, especially in lighter machinery lines, such as stationary gas engines and automobiles and parts. The only extension we have planned is the development of a line of manufacturing of machine tools. We have pretty well decided what this will be and as soon as we are in a position will push the development. We have no foreign trade, but regard the enlargement of foreign business as very desirable and were we in a position to offer our manufactures would certainly cultivate this branch of the business. A continuance of the present industrial conditions is very much to be desired and we feel that a conservative attitude as to prices and a hastening of the solution of the transportation problem would do much to keep the present prosperous conditions with us.

UNITED ENGINEERING & FOUNDRY CO., PITTSBURG.

The prospects for our business in 1903 seem to be very fair, although they are not as good as they were at the beginning of the year, 1902. We do not know of very many extensions which are being planned in our line of business but think that after the present stringency in money is over business will pick up again considerably. We have a great many inquiries now from South America, Mexico and some few from Europe. We have found it almost impossible to secure any European business unless it was some line of machinery such as tube works machinery, which we have covered by patents, otherwise we have been unable to compete with European manufacturers. We have secured considerable business in Mexico and are at present building a merchant mill there for Ricardo Honey. His mill will be located at Durango and will be operated by hydraulic power which he secures from the mountain stream some distance from his works and which has a drop of about 1,200 feet. He intends to install hydraulic turbine and will operate all his machinery by electricity. There is a similar mill located in Antwerp which we believe was described in your paper not long ago. We think that the foreign business can be considerably increased and see no reason why steps desirable for the enlargement of same should not be taken. We might also state that we are figuring on some new mills for the Sligo Iron & Steel Co., a new company which bought out Phillips, Nimick & Co., Pittsburg, and whose plant will be located in Connellsville, Pa. We are also figuring on a plate mill, shears, etc., for Dominion Iron & Steel Co., in Nova Scotia. Allegheny Steel & Iron Co. intend to install some additional mills in their plant and the Pittsburg Reduction Co. are also figuring on new mills.

VAN DORN & DUTTON CO., CLEVELAND.

The above company replying briefly to the inquiries reports prospects good, based on orders and inquiries, and adds that further extensions are planned in its own business and in lines which buy from the company.

THE AGRICULTURAL MACHINERY TRADE.

Next to the railroads—whose remarkable draft upon iron and steel works and locomotive and car shops in 1902 is measured in statistics given elsewhere in this issue—the agricultural machinery and implement works of the country are an important barometer of the consumption of iron and steel products. It is too early to determine the extent of next year's business in these lines, but the expressions from important interests are valuable as an index to conditions up to date:

International Harvester Co.

FROM THE GENERAL OFFICES.

As the agricultural implement trade depends upon the crops, it is too early to say what the outlook for business may be next year, but the winter wheat has gone into the winter in good shape and there is no present reason why the demand for iron and steel should not be large.

DEERING DIVISION, CHICAGO.

In our judgment the agricultural machinery and implement trades will demand as great a tonnage of iron and steel in the year 1903 as they have in the year 1902, provided always the crop situation is equally favorable. The amount of business in our particular lines is always dependent on the crops, and at this time it is too early to express any definite opinion in regard to them.

MCCORMICK DIVISION, CHICAGO.

The generally prosperous condition of this country would indicate, other things being equal, a good domestic trade in the line of agricultural implements we produce, but our business is so promptly affected by crop conditions which for the coming season are not yet determined, that it is out of the question at so early a date to estimate the trade with any degree of accuracy.

CHAMPION DIVISION, SPRINGFIELD, O.

The product of the Champion Division of the International Harvester Co., formerly the Warder, Bushnell & Glessner Co., will be somewhat larger for the season of 1903 than for any previous year. There was no unusual demand for harvesting machinery this past season so that we look for a good demand the coming year.

The Aultman Co., Canton, O.

Our plans for 1903 contemplate an increase in our agricultural machinery department of 35 percent over the output of 1902, and we have contracted for additional material for same, a good deal of which has already been delivered, as our manufacturing year begins Nov. 1. Assuming fair crop conditions for 1903 we are confident of another active year and while it is still too early to prophesy even as to winter wheat, because of the many chances it must yet encounter, up to date the conditions are unusually favorable. The condition of the crop is entirely favorable throughout the winter wheat section, with trifling if any exceptions. The cry of over production that was recently raised in a distinguished quarter, we take no stock in. In the chief elements of production—food, clothing, housing and transportation—we have been able to discover no over production thus far and we have no fear of anything like a general collapse, although there may be recurrences from time to time of tight money market, which should lead to caution, but not to pessimism.

D. M. Osborne & Co., Auburn, N. Y.

The present indications for our business are particularly bright, owing partly to the consolidation of several large interests in our line. We started to manufacture 1903 product earlier this fall than ever before and have run up to the present time with a larger force of men than ever before at this season of the year, running some departments night and day. The crop situation always is a large factor in the sale of agricultural implements, and while we are obliged to manufacture goods a long time in advance of any knowledge or indications of what the crops will be, we have faith at the present time that 1903 will be a record

year with us. While generally the country is considered as prosperous there are indications of a reaction in prices which may impede many developments now anticipated, and a gradual settling of prices in some lines will be welcomed by all interests. The cost of raw material in many lines is decidedly out of proportion to the value of finished product but there are indications that this unnatural condition will not last much longer.

The Troy Steel Company Transfer.

Authoritative announcement was made in *The Iron Trade Review* last week of the acquisition of the Troy Steel Co. property by the United States Steel Corporation, though denials were made in other publications and have been repeated elsewhere. Formal notice of the transfer of stock and bonds to the Steel Corporation has now been sent out. The property, it will be remembered, was bid in under foreclosure sale on Aug. 7 by Wm. F. Donovan, representing the heaviest stockholders and bondholders, including Standard Oil Co. interests, F. S. Witherbee and Wm. Kemp. The price paid by the corporation is somewhat above that paid by the above parties who had organized the Troy Steel Products Co. The transfer is effective Jan. 1. As heretofore stated, the three blast furnaces at Breaker Island will furnish pig iron for the Worcester, Mass., plant of the American Steel & Wire Co. The equipment of the mills will be transferred to Western plants.

New National Tube Company Plant at McKeesport.

(Special Telegram.)

PITTSBURG, Dec. 31.—It has now been definitely decided to locate the new $10,000,000 plant of the National Tube Co. at McKeesport, Pa. The options on the property required, costing about $750,000, will be taken up by the United States Steel Corporation in the next five days and all deals will be closed as fast as possible. Of the amount that the citizens of McKeesport were to raise, $15,000 is still unsubscribed, and unless the citizens make up the deficiency by voluntary subscriptions the city council will vote this amount to be paid out of the city treasury.

Oil Well Supply Co. Extensions.

(Special Telegram.)

PITTSBURG, Dec. 31.—The Oil Well Supply Co., of this city, has issued $2,000,000 of 5 percent bonds to cover extensive improvements recently completed at Oil City, Pa. In this city large additions are also being completed, including one building 106x264 feet, and a blacksmith shop 200x40 feet. At Oil City the plant covers 45 acres, while at Parkersburg, W. Va., the company has been enlarging its wood working plant. The bonds have been sold to the Union Trust Co., of this city, and the bonds are redeemable at the rate of $100,000 a year during the next twenty years.

The Vulcan Iron Works Co., of Toledo, O., states that it has sold during the past year, all of its "Giant" steam shovels, as fast as it could build them, and has orders booked far into 1903. The demand for steam shovels in 1902 exceeded that of any previous year. The Vulcan company's shops are now undergoing extensive additions to accommodate the increase of business.

The Bassett-Presley Co., Cleveland, jobber in finished iron and steel, has closed one of the most prosperous years in its history. Several new departments have been added and business in all lines has been large. A new 40-page stock list is now ready for distribution.

The Martel furnace at St. Ignace, Mich., will go in blast today on charcoal iron. Its capacity is 75 tons. The product will be sold by M. A. Hanna & Co. The Claire furnace at Sharpsville, Pa., of the same firm went into blast this week after being out more than two months on account of being unable to get coke. Work on the new furnace of the Detroit Iron & Steel Co. is progressing satisfactorily and it is now expected that it will be in blast about August 1.

NEW VICE-COMMISSIONER OF THE N. F. A.

An important development in the widening work of the National Founders' Association is the appointment of a vice-commissioner in the person of James S. Stirling, superintendent of the foundry department of the Harlan & Hollingsworth Co., Wilmington, Del. Mr. Stirling will share the work of Commissioner John A. Penton, the arrangement becoming effective with the opening of the new year. For the past 10 years Mr. Stirling has been active in foundry association work and soon after the National Founders' Association was organized he became identified with it as the representative of the Wilmington company. His opportunities for familiarizing himself with the policy of the association as well as with the practical workings of the molders' organization have been of the best.

James S. Stirling was born Dec. 23, 1871, of Scotch-Irish parentage, near Wilmington, Del. He received a public school education and concluded with a course at Rugby Academy, Wilmington, in 1887. His father, Victor Stirling, was the proprietor of two general country stores and in these he received his first business training. On

Jan. 1, 1891, he entered the cost department in the main office of the Harlan & Hollingsworth Co. and in November, 1892, was made superintendent of the foundry department, doing a general jobbing business in connection with the regular work of the company in castings for car and shipbuilding use. Mr. Stirling has been vice president for three years of the Philadelphia Foundrymen's Association, and was a member of the third district committee of the National Founders' Association during 1901 and 1902, participating in conferences at Philadelphia, Baltimore, Erie and Pittsburg.

Extensions of Pittsburg Mills.

(Special Telegram.)

PITTSBURG, Dec. 31.—Spang, Chalfant & Co., of this city, have plans prepared for the erection of an entirely new guide mill, and when this is in operation the old mill will be torn out and removed. A large new building is to be erected to contain this mill which will be modern in every particular and will greatly increase the output of the smaller sizes of skelp.

Moorhead, Bro. & Co., Inc., whose plant is located at Sharpsburg, have plans prepared for the erection of a new skelp mill and contracts will be awarded shortly. The company's new 20-inch mill for rolling grooved skelp will be placed in operation within a few days.

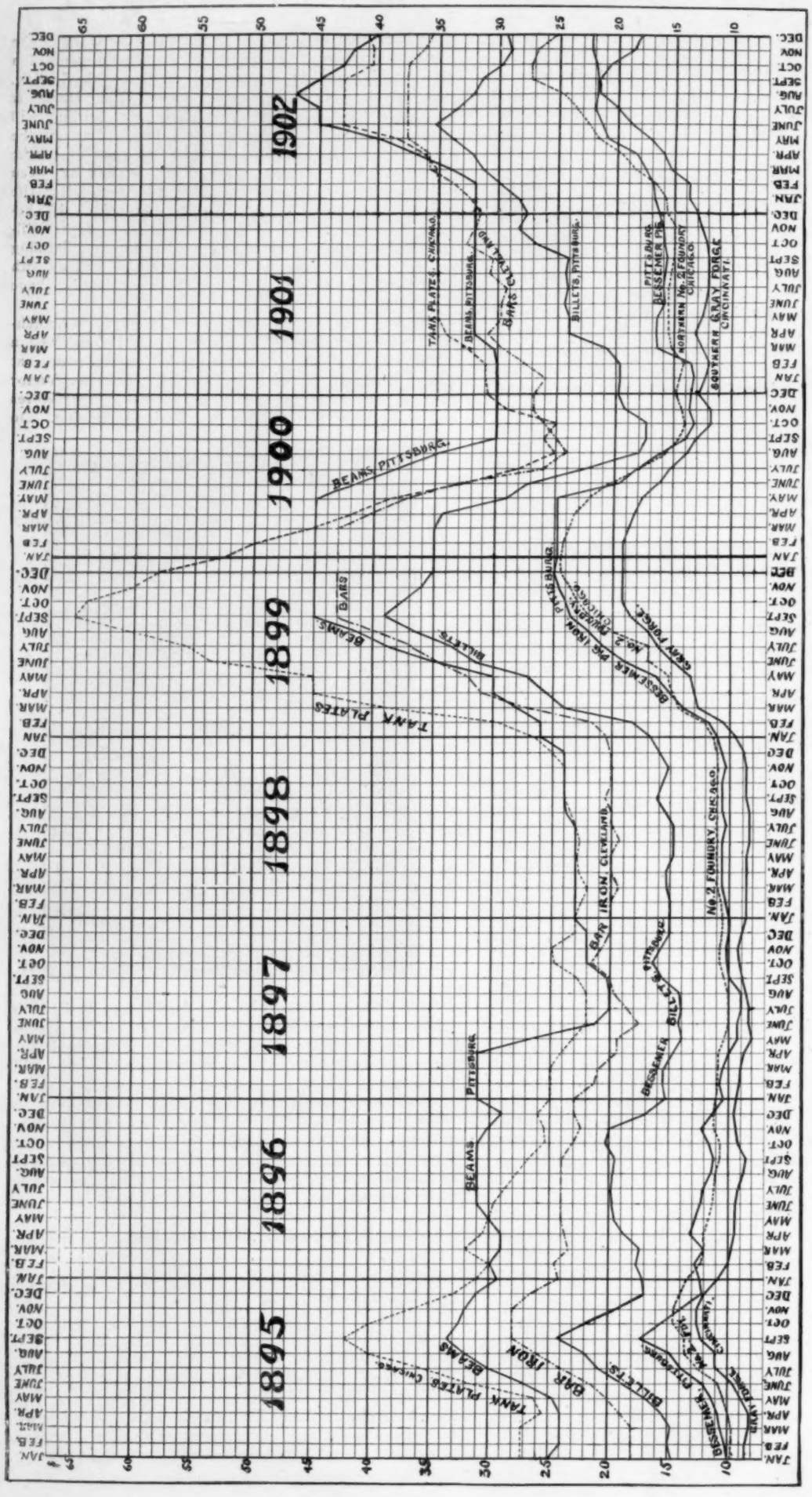

DIAGRAM OF PRICE FLUCTUATIONS IN IRON AND STEEL IN 1895-1902, INCLUSIVE.

(Prices in dollars per gross ton of Pig Iron and Billets; per net ton of Plates, Beams and Bar Iron.)

The pool price of Tank Plates, Chicago, during 1902, was $35 per net ton. The pool price of Beams, Pittsburg, during the year was $32, net ton, for such delivery as mills could make. The prices shown in the 1902 diagram for Northern No. 2 Foundry, Chicago, were those ruling for prompt delivery. For forward deliveries the price paid in January was $15.50; in February, $17; in March, $18.50; in May, $21; in July, $21.50; in August, $22.75; October to December, $23. Gray Forge, Cincinnati, in the first half of 1902, ruled $1 to $3 a ton less than the prices shown in the chart; in the second half, $1 to $1.50 less.

IRON MARKET FLUCTUATIONS IN 1902.

We have computed for 1902 the monthly market average prices of pig iron, steel billets and three forms of finished material, and on the opposite page present the price lines for the past year as well as for the seven years preceding. The diagram tells an interesting story of the booms and declines of the past eight years, and of the occasional intervals of steady prices. The little boom of 1895, that came in the midst of the depression that was upon all our industries, stands out, and much more prominently the boom of 1899, that was followed in 1900 by the well-remembered slide into the depths of low prices.

In the iron trade 1902 will be remembered as the year of strain and friction and difficulties, that may be called the pains of prosperity. Never was so much business done in iron and steel in the United States, and never were there greater embarrassments to the carrying on of manufacture and trade. The railroads staggered and groaned and fell under the load that was piled upon them. The story of these phases of this remarkable year, and of all the other features that make it memorable in our iron and steel history, is told with much detail in other columns. Next to the troubles that beset iron manufacturers throughout the twelve months is to be mentioned the restraining influence upon prices exerted by the United States Steel Corporation, in finished lines, and in pig iron by the leading producer of the South and the principal furnace interests of the Mahoning and Shenango Valleys, manufacturing steel-making pig iron for sale in the market.

Record-breaking production by the blast furnaces was a feature of the year. For the first half the figures of the American Iron and Steel Association show 8,808,574 tons. In the second half we estimate the output at 8,917,000 gross tons, and our estimate of the pig iron production of the year is 17,725,000 gross tons, as against 15,878,354 tons in 1901 and 13,789,242 tons in 1900.

Prices of the Past Year.

The chart on the opposite page shows the fluctuations in the prices of leading products in 1902, and the preceding years back to 1895. The vertical lines represent months and the horizontal lines prices per ton in dollars. The solid and broken lines that traverse the diagram indicate the changes in monthly average prices, but do not show necessarily the lowest or highest price touched in a given month. The difficulties in fixing the prices on which the diagram was plotted have been unusual for the year just closed. We have aimed to represent in the diagram the average of weekly prices on prompt delivery material. In finished material mill shipments have been made the sole basis in the years preceding 1902, but for the past year, in the case of plates and beams, since at times no material could be had from mills, we have taken jobbers' prices on large lots in the mid-year months. The aim has been to reflect the market as it stood in relation to the buyer who went after material deliverable within a week or two. Similarly in pig iron, the diagram represents the prices paid for prompt iron and not the prices for deliveries over six months or a year. There has been a greater diversity of prices in 1902 than in any other years covered by the diagram, and the lines for that year represent a smaller tonnage than those of any year preceding. The greater part of the pig iron, steel and finished material consumed in the year was bought at lower prices than those represented. At the same time, the average cost of the material consumed in the year was higher than for any year in the history of the trade. The table of monthly averages, from which the lines for 1902 were plotted, is as follows:

AVERAGE MONTHLY PRICES OF IRON AND STEEL PRODUCTS IN 1902.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Fdy Chicago.....	$15.80	16.75	18.62	19.75	21.75	22 50	23.40	24.66	27.15	27.15	26.90	25.40
Gray Forge Cincinnati..	$13.75	13.75	15.25	16.00	17 05	18 93	20,00	21.50	21 50	20,60	18,87	18.00
Plates Chicago.....	$35.00	35.00	35.25	36.25	38 60	43 00	43.00	43.00	43.00	40.60	40.50	41.00
Billets (Bess) Pittsburg...	$28.06	29.81	31.37	32.25	33.90	35.18	33 50	32.12	31 50	29,80	29,00	29 25
Bessem'r Pig Pittsburg...	$16.70	16.93	17.56	18.37	20.95	21.25	22 00	21,75	21.75	21.95	22.25	22,12
Beams Pittsburg.....	$32.00	32.00	34 00	37.00	40.00	45,00	45,00	47,00	45.00	43,00	42.00	40 00
Bar Iron Cleveland...	$32.10	33.70	35.70	35.77	37.70	37.70	37.70	37.70	37.70	37.50	36.20	35.70

Lake Superior Iron Ore in 1902.

BY DWIGHT E. WOODBRIDGE.

The close of an unusually eventful year gives opportunity for a resume of the situation in iron mining on Lake Superior as it has been changed by the circumstances of the past twelve months. That it has been the most notable season ever recorded no one conversant with the situation will question.

First, more ore has been mined and shipped down lakes than in any preceding year; the increase over the previous year is as great a sum as all ore shipped only eight years ago. Second, the activity of large interests in securing ore lands and mines on all ranges and in any amounts, the size of purchases having apparently no effect in restraining their consummation. In connection with this has been a more lively competition among furnace men of the East for ore reserves and a consequent boom in ore lands and developments such as has not been witnessed in the past. Third, the virtual determination of the largest owners of ore to sell no more, conserving for their own furnaces their supplies of raw material. Fourth, the continuation of combination and centralization commenced before, but now working back to the ore fields in a more startling way than ever.

The Amount of Lake Superior Reserves.

It is impossible that shipments be maintained at the present ratio of growth for the reason that mines would not long—long as time goes—stand the strain. The question arises, How much ore is there in Lake Superior fields? It is impossible and probably unwise to give an approximation. The United States Geological Survey says "about 500,000,000 tons on the Mesabi and half as much elsewhere." This statement is ultra-conservative. Twenty-five years of mining as actively prosecuted as now would, according to this estimate, exhaust the district. At any reasonable rate of increase 18 years would serve the same purpose. I do not doubt that the United States Steel Corporation alone has a considerably larger ore reserve than this total. And, though it is by far the largest owner of ore lands on the lake, there are others of importance and prominence. The Cleveland-Cliffs Iron Co. has enormously rich reserves and large tracts in the Marquette district that have been carefully selected. It is now increasing these areas under skilled and careful scientific advice. Others hold important reserves, varying from more than 100,000,000 tons down.

During the past year exploration for ore has been maintained at a pace never reached in the past. More drills have been in operation and they have done more thorough and careful work, at greater expense than ever. That the limits of profitable exploration are gradually being reached is evident from the results of this activity. Less ore has been found than before. Most of this exploration has been upon the Mesabi range, whose conditions are more favorable for exploration than are those elsewhere, and where work has always met greater reward. Most of the ore found in the year has been on that range, and most of that portion near the town of Hibbing, where the concentration of ore has now been found to reach a width of about two miles. On the flat dip of the rocks of the region it is nearly two miles from ore lying closest to the underlying quartzite rocks to that nearest the later slates. On old ranges some ore has been found in places, but most of the new ore there is the result of extensions of older and well known deposits. In all perhaps 75,000,000 tons of new ore have been developed by the year's work. The actual increase of merchantable ore is, however, much more than this—several times this in fact.

Uses for Leaner Ores.

As transportation facilities have increased, as costs of operation have diminished, as richer ores have been mined away, as combination and concentration have made possible economies not before thought of, and as mining concerns have found it better to ship their lean ores than to mine around them and take only better, classes of iron

ores have become available that before had been considered good enough for road making and for nothing else. This has been a development of the year. Millions of tons of Mesabi ores averaging not over 55 percent iron have been shipped this year and no small tonnage or ores considerably under that have been mixed with better and sent forward. On the older ranges ores otherwise suitable but running down to 40 and 45 percent iron are now mined and used to advantage. There are more millions of tons of these ores, many times more now known in the lake region, than the 75,000 000 tons of high grade found this year. Then in every district around the lake, and in the Canadian field from Michipicoten to Atikokan, are ores now considered unavailable. They contain elements injurious either to the pig or in the furnace. There are titaniferous ores, ores containing sulphur, siderites, limonites of low grade, by the hundred million tons in all probability, and that these will ultimately come into use every man who believes in progress must admit.

The Year's Explorations.

The result of explorations the past year in new lake fields has not been especially encouraging. On the Michipicoten range, which is geologically remarkably similar to the Vermillion, explorations have been continued on several finds and the results are encouraging for the development of mines. North of Lake Superior the Nipigon explorations, carried on a year ago by several large interests, have been abandoned. Little is now under way in the Mattawin, Atikokan, Hunters Island and Steep Rockfields, where many crews were then at work. These Canadian operations have been discouraging.

A vast amount of drill exploration has been carried along during the year on the western portion of the Mesabi, to and beyond the Mississippi River. But results have not been as anticipated by the sanguine individuals engaged therein and that portion of the range is now looked upon a unfavorable for the concentration of ores. For years the Vermillion range has been overlooked. But this winter more deep drilling is in progress there than since its early days. There is abundant opportunity for exploration and finds of ore are not unlikely. Explorations have continued all the year upon the wide areas of the Menominee where ore is looked for, but the only important result of four years of this work has been one good mine and a number of prospects. In the Marquette district the Negaunee area is being thoroughly explored and with excellent results. Several important mines will probably be opened there; one is now in the making. On the narrow Gogebic formation little has been found in the way of new ore though an abandoned mine or two has been proved of considerable probable value. Numerous old deposits have been shown to be larger than expected and many a mine is now a bigger property than at any time in the past, by reason of the discovery that its lenses extended in an unlooked-for way and for a considerable tonnage.

Ore More and More the Key.

When the foundation of a vast mass of capital lies in a commodity that cannot be manufactured and cannot increase it is but common sense to expect that that commodity will be carefully conserved by the owners who need it, and that its price, at least calculation, will be maintained. Iron ore is such a commodity and the large steel making concerns are its owners. That the largest of these is not to sell its product to outside steel makers is but a natural result of the situation and is due its own security holders. That the time has come when this startling position is to be held is very evident. The expectation of some such move is the cause of the great activity in mine buying by iron and steel making concerns the past year. But very few of them have been active enough, and the future is liable to show a still more insistent demand for ores than even of late. It seemed a year ago as though there was left no steel makers not fortified to a greater or less degree in ore reserves, but the events of this season have proved there were, and some of them are still "outside the breastworks." To be without abundant ore supplies will shortly mean too heavy a cost of raw material to permit operation.

Operations of the Steel Corporation.

The United States Steel Corporation this year mined from its own properties something over 16,000,000 gross tons. Of this a small part was sold, either to new buyers or on old contracts that still have some time to run. The railroads of the Corporation haulded to Lake Superior docks about 11,000,000 tons of ore, part of the property of outside steel makers, mostly its own. Its ships carried down lakes 9,500,000 tons and its contract vessels 6,500,000 tons more. These are tremendous figures and show to what a point the transportation interests of the upper lakes have grown. A rate of freight has been maintained steadily through the year by the efforts of this concern, and it is its policy to keep level through the year the various items of mining and transportation. By its great system it has been able to secure economies in mining and transportation that are of importance. In the single item of ore deliveries what at times approximated chaos has been reduced to a clear system remarkable for its efficiency.

The past year six lake mines have passed 1,000,000 tons each in product. The year before there were but two. Of the six, Fayal, a Mesabi range mine, reached a total of nearly 2,000,000 tons, and can easily make that amount next year, should it be desired. The Stevenson belonging to Corrigan, McKinney & Co., shipped this year 1,430,000 tons and is developed now so that 2,000,000 tons may be shipped another year, should occasion arise. This mine has made the most notable record of any on the lakes, for it was not opened until the summer of 1900, when a small shipment was made from underground. The following winter it was stripped and 666,000 tons were mined during 1901. This was really the mine's first year. Stripping continued steadily and now it leaps forward to a production unheard of two years ago. Mountain Iron and Mahoning, two more steam shovel mines, have exceeded 1,000,000 tons, and Adams and Norrie-Pabst, both underground properties, have done the same. Other mines might have come into the same class had it been necessary; but the removal of 1,000,000 tons of ore in a season is a tremendous undertaking and is economy in but few situations.

Among the most important mining groups on the upper lakes is that at Ely, on the Vermillion range. The product is steadily gaining, and is destined to increase more rapidly as the call for the splendid high-grade hard ores characteristic of the locality are demanded. Hard ore forms now a very small percentage of Lake shipments; Bessemer hard ore a still smaller proportion. Most of it comes from Ely. It is supposed that ore reserves there are very large and that the Ely area is one of the most important in the region. Important improvements have been made at this group during the year, and there now stand at Ely the finest shafthouses ever erected at an iron mine.

Many questions now in a state of solution will be settled during the coming year. Many steps of importance to the entire manufacturing world are likely to be taken. Many plans now in a formative state may be determined upon and announced. The present is more than ever a time when the iron maker looks on the future either in doubt or with satisfaction, the point of view depending upon the manner in which questions still young have been approached. The coming year will emphasize these questions and bring new ones that will need broad and liberal handling if success is to be maintained.

The foundry of the Pittsburg Locomotive Works, Allegheny, is to be practically doubled in size and capacity by the erection of an addition. The present output of the foundry is only about half of the requirements of the plant. The machine shop is also to be enlarged and other improvements are to be made which will materially increase the output of locomotives. About $500,000 will be spent in improvements.

The Monongahela furnaces and the Boston steel plant of the National Tube Co. at McKeesport, Pa., which have been idle for several weeks will resume operations within a few days.

The Machinery and Metal Working Trades—News Letters from Selling Centers.

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1054 ROSE BUILDING, Dec. 31.

The year just closed has been one of great prosperity for manufacturers of machine tools and there is abundant reason for believing that conditions will not be less favorable in 1903. Prices are about 10 percent higher than they were one year ago, the general advance having been made last July. Within this week, prices on a few tools have been advanced and it will not be surprising if there shall be further advances, because many contracts for pig iron and steel are expiring and manufacturers of machinery of all descriptions will be compelled to pay more for their material than they did when old contracts were made. It is at least safe to predict that prices will be firm.

The Interstate Engineering Co., recently organized by Kaltenbach & Griess, has let the contract for the complete equipment of its structural shops to be erected at Bedford, to Manning, Maxwell & Moore. The contract covers punches, shears, bending machines, rotary planers and other tools.

The Born Steel Range Co. has just completed an addition, 500x100 feet, which will be used as an assembling room. It is a splendid structure, admirably lighted. The report that this company intends to move its plant to Ashland, O., which has been published in papers of that city, is entirely without foundation.

David Hunt, Jr., who for the past year and a half had been Cleveland representative of Manning, Maxwell & Moore, started for Springfield, Mass., this week to assume his new duties of general manager of the Baush Machine Tool Co.

Strong, Carlisle, Hammond & Co. will open the new year in elegant new offices on the second floor of their building. All equipment necessary for the comfort of the large office force and for the prompt transaction of business has been provided. Additional floor space for the display of machine tools has been rented and the firm is prepared to break its record of 1902 in making sales. A 50-horsepower Walrath gas engine will be installed for the new lighting plant. The firm is now the agent for the Walrath gas engines, which are manufactured by the Marinette Iron Works Mfg. Co., Marinette, Wis. Among the recent sales was a 50-horsepower engine to the Resek Machine Co., which is building a new plant in this city.

George H. Bowler & Co., who have dealt extensively in second-hand machinery, will open a store room at 20-24 Factory St., where new machinery will be sold.

The Eclipse Machine Co. is equipping a machine shop in the Ajax building.

The Cleveland Pneumatic Tool Co. will soon move into its new plant.

The Snider-Hughes Co. is moving into its new plant, which now consists of a machine shop, pattern shop, and office. A foundry will be built in the spring.

The Cleveland Galvanizing Works Co., Cleveland, capital $50,000, has been incorporated by Henry H. Hodell, F. A. Hodell, H. H. Hodell and Wm. H. Keine.

Foote, Burt & Co. received more orders in December than in any previous month of their business. Inquiries are strong and are particularly gratifying in the fact that a larger per cent than usual result in orders.

Joseph Dyson & Sons are doubling the capacity of their machine shops and will be equipped after Feb. 1 to do rough turning and any machine work on forgings, or jobbing work.

The Chisholm & Moore Mfg. Co. has closed the most prosperous and profitable year of its existence. Orders are coming in freely in all departments and the company is very busy. The company's business consists of small orders in large numbers. Its principal products are malleable iron castings, chain hoists, I-beam trolleys and railway track appliances.

The Vulcanus Forging Co. informs us that December has been the busiest month of the year, but with the addition of the new machinery and enlargement of their plant, it is making fairly good deliveries on all orders. The company received several rush orders for car loads of rivets last week and in every case got the cars off in the time scheduled. Prices are good and the outlook for next year is bright.

The Reliance Gauge Column Co. reports that the close of the year 1902 shows that it has done a greater volume of business than in any previous year, and the outlook for 1903 is, indeed, very promising. The number of boilers and engines being put in throughout the country has direct influence on the sales of Reliance Safety Water Columns. The fact that the company's steam specialties are used by most of the large boiler manufacturers makes its business largely dependent on the volume of business which they do. Most of the large boiler makers look upon the prospects for next year with extreme satisfaction. The company's business in safety water columns and steam traps for the past year has been very gratifying and it looks forward to a no less prosperous year in 1903.

The National-Acme Mfg. Co. reports that the run of current business in both product and machines is keeping up well. It has important inquiries for machines, which promise well for sales directly following the first of the year. In the product department the company finds it necessary to shut down for a few days to take inventory, but the machinery end is quite too busy to admit of this, so that it intends running right along. It closed for Christmas Day only.

The Standard Welding Co. writes: "There seems to be a stability to the enormous demand that shows every disposition to continue indefinitely. In our own line of manufacture we find an immense demand for mechanical steel tubing in all sizes and gauges, for bicycles (which is a great improvement over the past three years). There is no doubt that there will be more first-class bicycles constructed in America during 1903 than have been built since 1895. The purchasers of material for this purpose are far more particular as to quality than they are as to price. They are looking far in advance, making great preparations for a good sale of bicycles during the coming spring and summer. For automobiles our seamless steel tube and seamless steel rims are in immense demand, which would indicate that great numbers of the three types, electric, gasoline and steam carriages, will be constructed. We have a method of welding by electricity that puts us in position to very thoroughly feel the pulse of the manufacturing trade, and from all of the various articles that we are called upon to furnish, and all of the special articles to be electrically welded that are submitted and given to us, we say that business is simply excellent."

The Cleveland Car Co., builder of industrial railway equipment, is now settled in its new and commodious shops situated at the junction of Lorain St. and the L. S. & M. S. Ry. crossing, West Park, O., being five miles west of the Cleveland union depot. These works have been fitted up with the most improved and up-to-date machinery for the manufacture of rolling mill, blast furnace, and coke cars. The company recently built and shipped to the C. Pardee Works, Perth Amboy, N. J., a number of ingot mold and billet cars.

The Acme Machinery Co. now occupies its handsome new offices and is operating its new shop. The latter is 80x180 feet, and increases the capacity of the plant 25 per cent.

CHICAGO AND THE WEST.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, Dec. 30.

The December business of the Henry Vogt Machine Co. Louisville, Ky., manufacturer of ice and refrigerating machinery, engines, boilers, etc., was twice that done in December, 1901. The company recently moved into its new plant covering 15¼ acres, which was built to meet the largely increased demand.

Jenney Electric Mfg. Co., Indianapolis, Ind., manufacturer of motors and dynamos, reports an abundance of orders, but is more concerned in filling what it has than in getting new business. Of late, the company has paid considerable atten-

tion to the printing field. A recent contract was taken from the United States Printing Co., Cincinnati. About fifty motors will be required. The company also has orders to equip the entire plant of the Modern Buggy Co., Auburn, Ind., with generators and motors; for three, 150 k. w. direct connected generators for the Claypool Hotel, Indianapolis, Ind.; for a large number of motors for machine shop use for the Atlas Engine Works and the Brown-Ketcham Iron Works, both of Indianapolis, and many smaller orders. It has shipped during the year about 50 motors to Australia, 40 to England, and smaller lots to other countries, though it has never paid much attention to export trade.

Whiting Foundry Equipment Co., Harvey, Ill., manufacturers of electric cranes, cupolas, etc., notices that orders have decreased somewhat during the past month. The company has a good supply of work in hand, and anticipates business will resume actively after the holidays.

Quincy Engine Works, Quincy, Ill., manufacturers of Corliss and vertical steam engines, recently shipped engines to the Indianapolis Light & Power Co., Indianapolis, Ind., and to the Illinois Valley Traction Co., LaSalle, Ill. The company has increased its capital stock to $400,000, and contemplates additions to its plant.

The Fisher Governor Co., Marshalltown, Ia., manufacturer of steam pump governors, reports that its total business last year was the largest in its history. It expects to see a continuance of present trade conditions in the coming year, and is making preparations to meet a constantly growing demand.

George Whiting Co., Chicago, manufacturer of punching, shearing, and bending machinery, reports the demand for its tools is satisfactory. During the past month, a number of orders have been received from large concerns in the country, and it expects to close this month for a large amount of machinery which will be wanted after the first of the year. Collections have been satisfactory. The company is rapidly designing and putting on the market new and improved machines, the latest being a rotary shears fitted with a number of necessary parts and attachments suggested by practical men. It is in correspondence with firms in Europe to handle its machinery.

The Anderson Tool Co., Anderson, Ind., finds the demand for its electrically driven universal grinders good. It is sold ahead for some time in both its gas engine and arc lamp departments. It made a shipment of grinders to Paris, France last month.

Lennox Machine Co., Marshalltown, Ia., reports that its business in the past year was about 25 percent greater than in that preceding, the company turning out over 100 rotary beveling shears in the last season. The demand for gasoline engines is also very satisfactory.

Stephens-Adamson Mfg. Co., Joliet, Ill., manufacturer of elevating, conveying and power transmitting machinery is receiving a large amount of work from the East and South for power transmission outfits, consisting of line shafts and rope drives.

Minneapolis Steel & Machinery Co., Minneapolis, Minn. manufacturer of the Twin City Corliss engine and builder of steel structures, has erected and is now operating one of the largest structural shops in the Northwest. It is equipped with an entirely new outfit of modern tools, and the company is taking contracts for the largest kind of bridges and structures.

National Machine Co., Milwaukee, Wis., manufacturer of lathes, reports a lessening in the volume of business in the past month, due to the holiday season. It recently received an order for seven finishing lathes which will be shipped shortly. It has increased the capacity of its shop by the addition of a 32-inch drill press built by the American Tool Works.

Milwaukee Machine Tool Co., Milwaukee, Wis., manufacturer of turret lathes, has its capacity sold ahead several months and a good number of inquiries on file.

Hill Tool Co., Anderson, Ind., manufacturer of tool holders, reports that business in the past month kept up remarkably well. Orders are being received from all parts of Europe, as well as the United States and Canada, the increasing business necessitating removal into larger quarters. New tools are soon to be added to the shop equipment, and a larger force of men employed. The company will be settled in its new building about Jan. 15, when it will begin the manufacture of several new specialties.

Waterous Engine Works Co., St. Paul, Minn., manufacturer of gas and gasoline engines, fire apparatus, etc., is adding a foundry. A considerable portion of the equipment has been purchased. The company has had a good year, and expects the new year to maintain the record.

Bignall & Keeler Mfg. Co., Edwardsville, Ill., manufacturer of pipe threading machinery, reports that business is all that can be desired.

Hardinge Brothers, Chicago, manufacturers of the Cataract precision bench lathe, chucks, taps and dies, etc., report that the volume of business done in the past year was 30 per cent greater than in any previous year. They recently doubled the capacity of their plant, but find that it will be necessary to further enlarge it. Orders have been received in the past month from Europe for the Cataract precision bench lathe, and the company expect to increase this trade later. They are about to put on the market a new automatic gear cutter, which is specially adapted to small gear cutting, from 5 inches down.

J. W. Duntley, president of the Chicago Pneumatic Tool Co., has returned to Chicago from a European trip. His principal object was to establish on the continent a new plant for the manufacture of pneumatic machinery, and he made arrangements for its erection at Fraserburg, in Aberdeenshire, Scotland. It will cost approximately $175,000. The necessary machinery will be purchased in this country. In regard to the work of the skilled mechanics his company sent abroad a few months ago to introduce pneumatic tools in Europe, Mr. Duntley speaks encouragingly. They are meeting with very gratifying results, especially in the foreign shipyards. While he was in Europe the men were devoting their attention to the shipyards of Germany.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., Dec. 30.

In the machinery market in this locality, December must be put down as the most fruitless month of what will always be known as the prosperous year of 1902. In being dull the market may be said to have met expectations, for very few if any, houses at its opening expected it to develop trade of any consequence. Yet here and there could be found a firm which reported no let up in its business.

The export machinery trade during the month, showed an improvement over November. This is said to be due to the dullness which recently overtook domestic trade, and which gave manufacturers an opportunity to get in communication with their foreign connections. The chief development of the month in foreign trade was the alliance formed between the Allgemeine and Union electrical companies in Germany, and the announcement that negotiations are now under way looking to price agreement arrangements between these two companies, and the Schuckert and Siemens & Halske companies, of Germany, also. In electrical machinery circles here, there is a difference of opinion as to the effect the understanding between these interests will have on the sale of American equipment abroad. Some think it will have a tendency to put a stop to recent ruinous competition abroad, and thus give a better tone to the electrical industry; others see in it an almost insurmountable barrier to any attempt on the part of American manufacturers to extend their business on the continent, particularly in Great Britain, and especially as long as German manufacturers manifest a willingness to sell their output at cost price, simply to keep their plants in operation, as at present. There are some local manufacturers who are not interested in the matter at all, stating that after you pay duty and freight charges, sales abroad leave little or no profit.

The scheme to form a combination of all of the steam pump manufacturers, outside of the leading interest, is still being pushed. One of the projectors is not at all dismayed by the delays and difficulties that have already been encountered, stating that nearly seven years of negotiation was necessary before the International Steam Pump Co. was incorporated.

The attempt to consolidate manufacturers of traveling cranes has not yet taken tangible form, but the project is receiving the same consideration it did when it was first broached. One interested manufacturer says that the slightest recession in

the business would do more than anything else to expedite the scheme, but at the present everybody is too busy to give it attention. Another proposed combination which made its appearance recently, relates to emery wheel manufacturers. There are supposed to be 30 manufacturers in this country and in trade circles, while the feasibility of amalgamating them is acknowledged, the difficulties are regarded as more numerous than appear on the surface.

Mackenzie and Quarrier, of 203 Broadway, representing the Harrisburg Foundry & Machine Co., have received an order for two 240-h. p. engines from the Barber Asphalt Co., at Maurer, N. J.; also orders for a 75-h. p. engine, from the International Phosphate Co., Carteret, N. J., and for one 240-h. p. engine, from the Monterey Foundry & Machine Co., Monterey Mex. This firm has a good sized engine order in prospect, which it expects to close early in the new year.

A. J. Granger & Co., of 95 Liberty St., have received an order for a municipal electric light plant at Frankfort, N. Y., which aggregates over $10,000, and which consists, among other things, of a Corliss engine, boilers, and smoke stack. This firm, which makes a specialty of equipping steam and electric plants, says that from information in their possession, the new year bids fair to eclipse 1902 in this direction.

We are reliably informed that the Union Iron Works, at Erie, Pa., has plans under way for enlarging its plant, and that it will be in the market in the near future for cranes, rolls, and punches.

The Bullard Machine Tool Co. informs us that they will not need any new machinery for the addition they are erecting to their plant at Bridgeport, Conn., beyond a 15-ton crane, the order for which has already been given.

The C. & C. Electric Co., of West and Liberty Sts., took the following orders for motor driven tools recently: One 150-k. w. generator, Rogers Locomotive Works, Paterson, N. J., being the second order of the same kind received from this concern lately; one 125-k. w. generator, Consumers' Ice Co., Chicago, Ill.; one 40-k. w. generator, Hall Signal Co., Garwood, N. J.; one 50-k. w. generator, International Phosphate Co., Cartaret, N. J.; one 60-k. w. and two 40-k. w. generators, apartment house at Broadway and 55th St., this city; one 50 and one 75-k. w. generator, Belgrave Hotel, Philadelphia; and 100-h. p. series parallel equipment, for dry dock suction pump service, James Tregarthen & Sons, Seventh St. and East River, this city. In the matter of small orders, the company's December business was as good as any during the year.

The Babcock & Wilcox Co., of 85 Liberty St., which has been extending its boiler business in South America, reports that governmental disturbances in that country have seriously interfered with trade, especially in Venezuela.

The Pioneer Iron Works, on Williams, near Van Brunt St., Brooklyn, N. Y., which is one of the largest builders of special machinery in this vicinity, is turning out considerable sugar and road-building work nowadays.

The W. B. Smith Machine Co., of Liberty and Church Sts., manufacturers of wood-working machinery, reports piano manufacturers to be its best customers of late, with establishments in New York City and New England States good buyers. This company is now paying $24 per ton for its iron.

Edwin H. Ludeman, of 39 Cortlandt St., the local representative of the Fitchburg Engine Co., Fitchburg, Mass., has received from F. Berg & Co., of Orange, N. J., an order for two 300-h. p. compound condensing engines, direct connected to alternators. Considerable interest was manifested by the trade in this order, because the company contemplated the purchasing of steam turbines instead, and had a thorough investigation made of their efficiency. According to its engineer, steam turbines were found more efficient than engines at first, but in the long run engines were to be preferred on that score. Another objection the engineer found with turbines was that they made too much noise, although a saving of several thousand dollars could be effected by installing them.

At the local offices of the Westinghouse Electric & Mfg. Co., at 120 Broadway, all but positive confirmation was given to the report that the company had received an order for electrical equipment, aggregating over $2,000,000, from the New South Wales government for its tramway system. The order comprises several 9,000-h. p. engines, signalling devices, and air brakes.

Paul Bigelow, New York agent of the Buckeye Engine Co. at 39 Cortlandt St., has received an order for one 150-h. p. engine from the Danbury and Bethel Electric Light Co., of Danbury, Conn., and an order from the E. M. Brown Paper Co., Balston Spa, N. Y., for one 125-h. p. engine. Mr. Bigelow says that his inquiries during December were larger than for either November or September.

The International Steam Pump Co. is giving out orders in piecemeal fashion for the $200,000 equipment it is going to install at the plant of the Snow Steam Pump Co., at Buffalo, N. Y. The orders thus far given out, which are small in the aggregate, have been widely distributed. Definite information as to when the company will give out the specifications for the $500,000 equipment of the new Henry R. Worthington plant, at Harrison, N. J., is still withheld. We are informed that if the inability to get building material for the new plant goes on as it has recently, the specifications are likely to be held back until well on in the new year.

Messrs. Treadwell & Co., of 95-97 Liberty St., report a good business for December. Usually this month is a dull month for the special machinery business, as most of the concerns await the closing of the old year accounts before placing orders. They have received orders for ten slag cars from the American Smelting & Refining Co., six being for their Monterey plant, Monterey, Mex., and four being for their Auguascalientes plant, Mexico. These cars will be equipped with electric apparatus for the propelling power. Another order received was from the Dominion Iron & Steel Co. for the Sydney Furnaces, Cape Breton, N. S., for a lot of 20-ton Treadwell hot metal cars of the improved design. The company is also finishing the installation of the Industrial Railway at the Spauldings & Jennings Works of the Crucible Steel Co. of America, Jersey City. This installation is considered one of the largest of its kind in this section of the country. Over one mile of 21-inch track has been installed under roof. The equipment consists of 24 all-steel cars, 6 all-steel cars with wooden decks, and 2 steel cars of special construction and known as transfer turn tables. They have also completed the installation of an industrial railway at the National Lead Works, Brooklyn.

Withal the month was remarkable for the unmistakable evidence it offered of good business to come. In machine tools, this was particularly the case. During the month, the information was received that the Westinghouse Electric & Mfg. Co. had plans under way for purchasing the equipment for the large addition it is now erecting at East Pittsburg, Pa., and which, when completed, will practically double its capacity. The expenditure for equipment is estimated at about $1,000,000. Another good order thht will be given in the near future is for the equipment of the new shop the Chicago Pneumatic Tool Co. will erect at Fraserburg, Aberdeenshire, Scotland, President Duntley announcing that American machine tools will be installed. Work on this new shop will be pushed with all possible haste, as the company is anxious to have it in operation at the earliest possible moment. As regards the purchase of machine tools on a smaller but equally as profitable scale during the next few months, assurances were plentiful. From several sources it was learned that the shop capacity of many railroads will be greatly increased during the coming year, with the purchase of the necessary machine tools likely to involve considerable outlay. One concern is in receipt of a letter from the purchasing agent of a large railroad, stating that his company is now using rolling stock that ought to be receiving the attention of the repair shop, but which must be used, pending the arrival of new rolling stock which has been ordered. The letter then adds: "After we get this rolling stock we will have occasion to make extensive use of our repair shops, and expect to give you a good order for machine tools. There are a good many roads in the same situation.'

Another development in machine tools during the month was the numerous small orders that made their appearance but which will not be given out until some time during January. If any reliance is to be placed on all that was said in this connection, January ought to be a banner month with many houses.

General satisfaction is expressed over the way prices

have been maintained recently. Since the latter part of November, when the machinery market began to get inactive, and up to the present week, conditions were extremely favorable for those who cared to do business at reductions from current prices; but reports of cutting are not heard. Deliveries are fast approaching the condition where an order for a standard machine can be executed in better time than for a year. We find many houses are pleased with this state of affairs, saving that on the whole it is much preferable to take an order where immediate or early delivery can be promised, instead of compelling a customer to wait for several weeks, if not months, as has been the case for practically all of 1902.

One of the largest orders for electrical equipment which will be placed early in the present year, will be given by the New York Central Railroad Co. Last Friday the company received permission from the New York City authorities to change its motive power from steam to electricity, from the Grand Central depot to Croton, N. Y., a distance of about 35 miles. Before work can begin the company must also have the consent of the State Legislature. A bill to this effect has already been drafted, and will be introduced in the present session of the legislature, whose proceedings begin with the opening of the new year. Every effort will be made to pass the bill with as little delay as possible, and its enactment into law, in a few weeks, is confidently expected. In the meantime, the company will have the specifications for the necessary equipment prepared, the cost of which will be at least $6,000,000, if not considerably more.

PHILADELPHIA.

Dec. 30.

The year is rounding out very satisfactorily, and 1902 will be remembered in the machinery trade as a year of steady business with no disturbing influences whatever. While the new business taken during December has been somewhat light there has been plenty of work turned out in the different shops, and the shortcoming, if it may be so termed, will cut no figure. The number of inquiries in the market is surprisingly large, and the indications are that January will see a very heavy business done. There appears to be a general disposition on the part of buyers to defer the placing of orders until next month. Why this should be the case nobody ventures an opinion. Undelivered machinery does not as a rule figure in balance sheets under the head of liabilities, therefore a reason can hardly be sought in this direction.

The lull of the last six or eight weeks has had some little effect on dealers' stocks. Gaps are being filled up and floors are presenting a better appearance than for some time. Advantage has been taken of the holidays to straighten out stocks and clean up. Vacations, too, have been in order, many dealers and agents who found the stress of business in the summer too great to allow of a vacation, taking the opportunity presented by a more than usually dull holiday season.

Deliveries are much improved and machinery of a standard character can be had fairly promptly. If, however, the influx of orders next month should be as great as anticipated, according to the specifications and inquiries already in the market, deliveries must be lengthened before the new year is very old.

Foreign business shows no improvement in volume. Quite a little is being done, but it is not sought after to any extent and comes mainly as the result of previous efforts. One of the largest orders from abroad has been taken by the J. G. Brill Co., of Philadelphia, for a lot of car trucks to be used on a railroad near Kawasaki, Japan. It is also understood that the Baldwins have the order for the engines for the same road. Another order of good size was one taken by the Sugar Apparatus Refining Co. for an evaporating plant to be erected in Porto Rico.

A half million dollar car building plant is to be built by the Delaware, Lackawanna & Western Railroad in West Scranton. Plans and specifications have been completed and bids will soon be asked for.

The Pennsylvania Railroad Co. is considering the establishment of a large printing plant in Philadelphia, with possibly a smaller one in Pittsburg, for turning out its own printing, the amount of which is enormous. Estimates for the plant are being prepared, but plans are not yet fully matured.

The Hale & Kilburn Mfg. Co. is to erect a new factory at 18th St. and Glenwood Ave. The company manufactures railroad seats and car fittings and also has a large wood working department. The new plant, estimates for the building of which are about to be invited, will consist of a four-story building of U shape, to include a main structure with two wings, each to measure 70x260 feet, and a machine shop, 210x 70 feet. Considerable new equipment will be purchased.

The Philadelphia Pneumatic Tool Co. had a good month's business, and is closing what will be the best year of its existence. Established in its new and well equipped plant, it will start the new year with splendid facilities for taking care of a rapidly growing business. The company has just received an order for an entire equipment of pneumatic tools for the German Navy Yard at Kiel, the equipment including the necessary compressor and piping. Other orders received during the month include a large one from the Pennsylvania Railroad Co. for different tools; another from the Cambria Steel Co. for riveting hammers; and another, which is a second order, covering general tools for shipment to Milan, Italy. The company has also booked some good sized orders for shipment to France and England. It is meeting a good demand for pneumatic foundry rammers, and is bringing out an additional size intended for pit ramming, which will make four sizes in this particular line.

The Falkenan-Sinclair Machine Co., report an excellent month's business. A number of standard presses, small to medium sizes, were shipped during the month, and several machines of large size. In the latter class were some large double crank presses to New York City, and two large hydraulic presses to parties in New York State. The testing machine department is very active, a number of good orders being in hand. The company is just shipping from this department a new patented automatic cement testing machine to parties in West Virginia. Inquiries are quite prolific, and the prospects for the opening year particularly bright.

At the Bourse nearly everybody in the machinery department is jubilant over the prospects for the first half of 1903. Inquiries have been very plentiful during the past four weeks, and cover a vast amount of business, but very little could be placed during December, most deliveries being called for in January. Still the aggregate of the business done this month was in every way satisfactory, one or two of the agents claiming to have found December one of the best months of the year.

The J. W. Cregar agency is double decking part of its space, which is already the largest in the Bourse. The agency has just added to its lines that of the Kempsmith Mfg. Co. Milwaukee, Wis., and is placing five sizes of Kempsmith universal milling machines on view. The agency will also represent the Bignall & Keeler Mfg. Co., Edwardsville, Ill., maker of pipe cutting and threading machines. Another addition to the Cregar agencies is the line of shapers made by Geo. D. Walcott & Son, Jackson, Mich. Mr. Cregar reports an excellent demand for Franklin portable cranes and hoists, his sales for the past six months covering 167 machines. The Cregar agency is just putting on the market a line of post hammers to be operated by steam or compressed air. It comprises two sizes, 100 lb. and 250 lb. capacities respectively. These hammers are claimed to be particularly well adapted for railroad, mining, blacksmith's, and general machine shops.

The Hess Machine Works, builders of file making machinery, continue quite busy at their plant. Among the orders recently secured we mention one covering a complete equipment for shipment to France

The Tabor Mfg. Co., builder of molding machines, had an execellent month in point of both orders and shipments. The orders include a 7-in. power ramming machine and a 14x16 split pattern machine for the Allen Fire Department Supply Co., Providence, R. I.; two 7-in. power ramming machines for the Trenton Malleable Iron Co., Trenton, N. J.; a 7-in. power ramming machine for the Allis-Chalmers Co., Milwaukee, Wis.; a 14x16 machine for the Pratt & Cady Co., Hartford, Conn.; a 13x18 machine for the Benj. Atha Co., Newark, N. J.; a 24x24 split pattern machine for the Niles Tool Works, Hamilton, O.; ten 7-in. power hammers for Sargent & Co., New Haven, Conn.; a 19x40, and a 34-in. round, split pattern

power ramming machines for the National Supply Co., Toledo, O.; a 13x18 machine for the Hempfield Foundry, Greensburg, Pa.; and a 13x18 machine on a duplicate order for Schaefer & Budenberg, Brooklyn, N. Y.

The Newton Machine Tool Works have had plans prepared covering the additions to their works noted in *The Iron Trade Review* of Dec. 4, and are about to ask for bids for the construction. It is intended to push the work along as rapidly as possible in order to relieve the congested condition of the present shops. When completed the works will be capable of furnishing employment for upward of 400 hands.

Edw. Harrington, Son & Co., Inc., builders of machine tools and manufacturers of hoists and tramrail equipment, are enjoying a good demand for their line of goods, particularly for hoists, their business in which is increasing considerably.

Israel H. Johnson, Jr. & Co. report a good business for the month, their shipments including a 52-in. by 35-ft. lathe to a Western concern, and many lathes of small to medium size to various points. Application has been made for a charter incorporating the firm. No change whatever is to be made in the business or its management, but a slight change is to be made in the firm name as a company.

The Turner Machine Co., builder of molding machines and cock grinders, has removed to more commodious quarters at 2nd and Diamond Sts. The company has some nice orders in hand, and prospects for a largely increased business during 1903 are good.

The influx of business at the Baldwin Locomotive Works is phenomenal. The fullest capacity of the works has been exceeded, and it seems now that booking and building have to go hand in hand. It would be very hard to get an order in for a delivery in less than a year, unless a preference or order or delivery option had been previously secured. The concern has recently booked an order from the Lehigh Valley Railroad for 40 locomotives of the latest and most approved type. Building permits are about to be taken out for improvements to cost over $187,000. These improvements will cover a power house of brick, with galvanized iron roof and steel beams, columns and girders, the dimensions of the building to be 99x152 feet, and the location, the north east corner of 16th and Hamilton Sts.; a round house of irregular shape, 384x326x480 ft., brick and steel construction, at 26th and Aspen Sts., with a frontage on the Phila. & Reading Railroad; and an extra machine shop at 15th and Hamilton Sts. which will enclose the end of Hamilton St. in accordance with the privileges obtained through a recent deal with the city authorities.

Thos. H. Dallett & Co., builders of portable drills, say that they are closing a very satisfactory year. They have a great deal of business in hand and both orders and inquiries are coming in a manner which insures busy times for some months.

The Shenango plant of the American Tin Plate Co., New Castle, Pa., was placed in partial operation this week. Twenty of the hot mills are now on in full and the remaining ten will be placed in operation shortly. On Monday, Jan. 5, the entire hot mill department of the Greer plant of the American Tin Plate Co. at the same place, consisting of twenty mills will be started, while the cold rolling and tinning department of the Shenango plant will be placed in operation on Jan. 12, and these departments of the Greer plant will be on in full on Jan. 19. The Demmler plant of the American Tin Plate Co. at McKeesport, Pa., containing eleven mills was started up this week, while the Pittsburg plant at New Kensington, Pa., resumed in full about 10 days ago. The stocks accumulated at nearly all the plants of the American Tin Plate Co. during the summer months are practically depleted, and large orders for tin plate for domestic consumption have been made during the past month at $3.60, the price recently established by the company. Independent tin plate manufacturers are also having a better demand and market conditions are much stronger than they have been at any time during the past seven months. The plants at New Castle, Pa., have been idle since early last July.

J. F. Deems, general manager of the plant of the American Locomotive Co., Schenectady, N. Y., has been appointed general superintendent of motive power for the Indiana, Illinois & Iowa Railroad.

COKE WORKERS' WAGES 63 PER CENT ABOVE 1894.

The advance in wages announced last week for the coke workers and miners in the Connellsville region of Western Pennsylvania by the H. C. Frick Coke Co. is the sixth voluntary advance made in the last seven years, and wages are now 63 percent above the scale put in force on Feb. 10, 1894. This advance will not only be shared by the workers employed in the mines and at the ovens of the H. C. Frick Coke Co., but by those employed at all the coal mines and coke works of the United States Steel Corporation in this region. Immediately following the announcement the outside coal and coke operators in the region notified their men of similar advances to take effect Jan. 1, 1903, making the wages of all the workers in the upper and lower regions uniform. In the past the outside operators always followed the H. C. Frick Coke Co. in making advances in wages and although the rates already paid these men are higher than anywhere else in the country they have decided to make the same advances to their employes.

On April 1, 1895, a 16 percent advance was granted the men in the region and on Oct. 1, the same year, another voluntary advance of 6 percent was made. On Jan. 1 1896, advances in wages were again announced ranging from 10 to 15 percent and on April 29, 1899, a 7½ percent advance was announced. On Feb. 28, 1900, a new scale was made which advanced wages 12½ percent on March 1 of the same year and this was the last advance announced until the present one. The following table shows the wages paid according to the scale of Feb. 10, 1894, and the new scale of Jan. 1, 1903:

	Feb. 10, 1894.	Jan. 1, 1903.
Mining and loading room and rib coal	$ .78	$1.35
Mining and loading heading coal	.88	1.50
Mining and loading wet heading coal	.95	1.50
Drawing coke per 100 bushels charged	.43	.77
Leveling	.08	.12¾
Drivers and rope riders (shafts and slopes) per full run	1.65	2.50
Drivers and rope riders (drifts) per full run	1.60	2.40
Cagers, per full run	1.65	2.50
Tracklayers, blasters and timbermen (shafts and slopes) per day	1.65	2.50
Tracklayers, blasters and timbermen (drifts) per day	1.60	2.40
Assistant tracklayers and inside laborers	1.35	1.97½
Dumpers and tipplemen	1.35	2.00½
Teamsters, per day	1.35	1.90
Carters, per day	1.20	1.70
Yard laborers	1.10	1.65
Chargers, per oven	.03	.05
Chargers, per day	1.40	2.00½
Trapper boys	.50	1.10
Forking cars, 40,000 pounds capacity	.85	1.65
Forking cars, over 40,000 pounds capacity	.95	1.80
Forking cars, less than 40,000 pounds capacity	.75	1.65

Charles Schmutz has been promoted to the position of general sales agent of the cement department of the Brier Hill Iron & Coal Co., Youngstown, O.

Statistics regarding the number of stockholders of the United States Steel Corporation have been made public. When the first dividend on the commop stock was paid on September 14, 1901, the corporation had on its books 13,918 common shareholders. The sixth dividend on the common stock, on December 30, 1902, was paid to 24,636 shareholders. The first preferred dividend, paid on August 7, 1901, was divided among 18,569 shareholders, while the last dividend, paid on November 15 last, was disbursed to 29,258 stockholders. The company now has on its books the names of 53,894 stockholders, an increase of 21,407 in 15 months.

The Lalor Engineering Co. of Philadelphia, Pa., has awarded the contract for the erection of a foundry and machine shop for the Westmoreland Boiler Co. at New Kensington, Pa., to Kendrick & Co. of Philadelphia, Pa.

After January 1, the name of the Acme Sucker Rod Co. of Toledo, O., will be changed to that of the S. M. Jones Co. The reason given for the change in the company name is that sucker rods are now so well known to the trade that it is no longer essential that the name of the product be contained in the firm name.

The "Duca" Card System.

BY ROBERT GRIMSHAW.

Herewith are given a number of card forms, originating with and used by the German machinery manufacturer Max Sponholz, and called by him the "Duca" system. We may divide these cards into those which have to do with the office alone and those which record shop items.

One of the first things is to keep an account of inquiries which come by mail; to follow them up and to trace and record the result of such following. A good form is shown in the card illustrated by Figs. 1 and 2, the front and back being

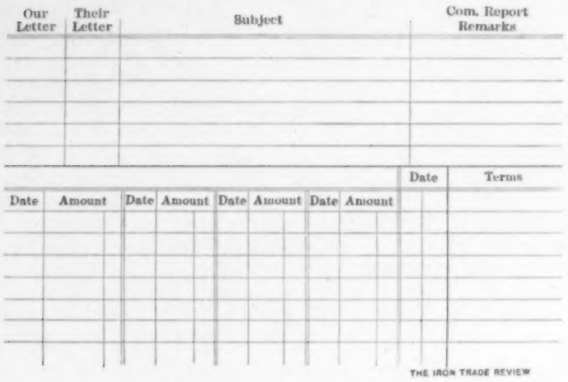

FIG. 1.—CORRESPONDENCE RECORD.

different. On the face are entries solely pertaining to correspondence, but this correspondence can concern any number of articles. The back is partly devoted to the financial results of such correspondence.

Following Up Offers.

Naturally, when an inquiry comes in an offer is made; but success often hinges upon the way in which this offer is kept in sight and followed up.

A card on which the inquiry is recorded is arranged as follows:

City ..... State ..... Page .....
Name ..... Branch .....
Letters sent .....
Letters received .....

ORDERS.

Date. Am't. Date. Am't. Date. Am't. Date. Am't.
....
....
Rating ..... Remarks .....
....
Terms .....

Here there are places for noting letters received and sent. All such cards are arranged in the order received, so that say eight or ten days after the first entry thereon is made they

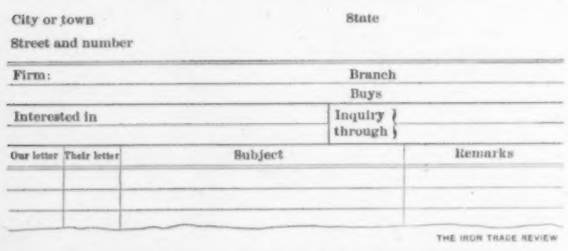

FIG. 2.—FINANCIAL RESULTS OF CORRESPONDENCE.

come again to the eye of the correspondent and remind him to "give the ball another kick." The date of this second effort is noted and the card again set ahead; and so on until the thing is definitely settled one way or another. In case of non-success in this particular case, the card is put in a drawer specially for "possible customers." In case of success the cards are arranged alphabetically, or first according to country or city and then under each head alphabetically according to firm names.

Such material is of great use in sending out circulars, etc., and also of help to travelers. These latter can take the cards themselves or make copies of the entries thereon, according to whether or not their departure is hurried.

Travelers' Reports.

The success and worth of travelers can be measured not only by the gross amount of orders received but by the amount of profit thereon and the prospect of further business in the near future. In order to have a daily check on travelers the latter are given the record cards corresponding to the firms

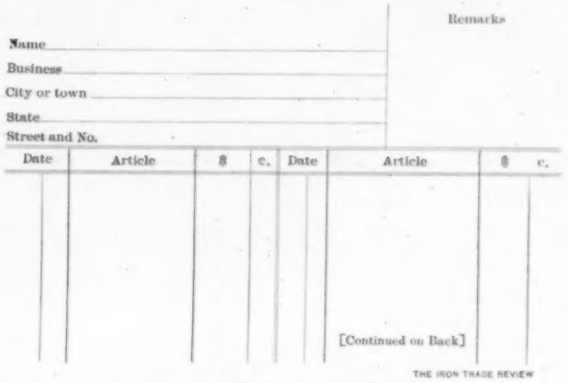

FIG. 3.—RECORD OF ESTIMATES.

which already are in business connection with the house they represent; and for each firm which they visit they return their principal this card together with appropriate remarks. For "new" firms they fill out and send home new cards. This keeps the address lists complete and correct without cost, and at the same time is a check on the traveler. The following form is used for this purpose:

Firm .....
Street and No. .....
City or Town .....
County .....
State .....
Business .....
Interested in .....

On the back of this form is another printed form which covers the particular printed matter sent. This material is known by numbers and by suitable blanks to which dates may be assigned and the character and amount of the advertising material may be traced. There are also blanks for recording the despatch and receipt of letters, orders, etc.

Recording Estimates.

For this purpose the cards are arranged alphabetically according to the name of the articles referred to. The use of

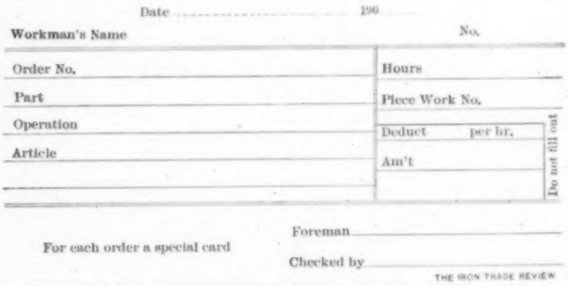

FIG. 4.—PIECE WORK CARD FOR WORKMEN.

such cards as are shown in Fig. 3 is vastly superior to the usual way of digging out letters of all sizes and shapes. In this system each offer is recorded on a card on which the name of the article is given. Where an offer is mare orally in person (this being the correct word for what is usually called "verbally") or by telephone, it is at once recorded on a card just as if it had come in by letter.

Incoming orders may be entered on cards ruled and rubricked as shown below, and which have serial numbers according to which they are arranged. In the Sponholz establishment these are blue.

Order No. .....
Material .....
No. Size. Weight .....
Firm .....
Price per piece .....
Amount .....
Remarks .....
.....
Date .....

"Foreign" Customers.

This term is often applied to those who do not live in the same town as the manufacturer, and with whom business has largely to be transacted by letter. The cards used for such persons contain the name of the firm, street and number, city, county, business, with several lines for remarks, and are subarranged alphabetically according to customers' names, in main groups alphabetically arranged under the city names. They are kept where correspondence clerks and travelers can consult them.

Name No. Piece Work No. .....
Article
Part
Operation
No. of Pieces Price per Piece Amount
Begun 190
Finished
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FIG. 5.—PIECE WORK CARD FOR OFFICE.

The card list of towns embrace, usually, all cities and towns having over, say, 3,000 inhabitants, geographically classified and alphabetically sub-arranged. Each town name is given with all details necessary for prompt mail, telegraph and freight delivery. No sample need be given here.

Listing Catalogs and "Sources."

Among the various catalogs and circulars, there are often many things which are mere "side lines," or which are the only ones among the various articles therein described in which the recipient is in any way interested. These he can note on forms for future reference and use as follows, the heading of the cards being given:

Where to Buy .....
Name. Address. Catalogue. Page
.....
.....
Name ..... Address .....
Principal Things Made or Sold. Catalogue. Page.
.....
.....

Cards of the former type are arranged alphabetically according to subjects, those of the latter according to names. The cards are put in numbered cases, and the catalogs are marked with the number of the cases in which the cards referring to them are to be found. Circulars are bound up in pasteboard or heavy paper covers, and these are numbered.

Drawings.

As soon as a drawing is made, it is given a serial number, which, together with the subject, is entered in a record book. For each number in the book there is filled out a card bearing the legends. "Type," "Name," "Drawing No." on the upper line, followed on the next line by: "This Sheet contains following Contractive Details, Original, Tracing," heading three columns, and further down the sheet are columns for "Blue Prints" and "Altered Blue Prints," for dates, etc. Two lines are reserved for "When Drawing was Finished" and "Name of Draftsman."

These are classified under kinds of machine, etc. No drawing must be let go out of the drafting room without a receipt which is put in the case next the card corresponding to the drawing delivered. Each foreman has a number of receipt cards of the same size as the registry cards; and these are numbered serially and also bear his initials, name, or number. When he re-delivers a drawing, he demands and receives the corresponding receipt card.

A similar system should be in use with regard to patterns. The foundry should give receipts to the pattern shop or the pattern storeroom for all patterns, core boxes, stripping plates, etc., drawn.

Pattern and Drawing Records.

The cards for this purpose are arranged as follows:

Name .... Dept.
Type ..... Place .....

IN		OUT	
Date.	No. of Pattern.	Date.	Rec'd by
.....	.....	.....	.....
.....	.....	.....	.....

These are used by the clerk in charge of the pattern storage room or of the one in charge of the drafting room, for recording the whereabouts of patterns or of drawings; the dates in and out, the number of the pattern (or of the drawing as the case may be) and the name of the employe receiving it, being recorded. The foundry or shop foremen may keep similar records as a check on possible negligence of the storekeeper.

Type Machine No. ..... Card No. .....

Drawing	$	c.	Operation	Hrs.	$	c.	Material	$	c.	Material	$	c.
Wood Pattern			Planing				℔			Wages		
Wages "			Forging				Am't			Drawing ℔		
℔			Turning				Wages			Pattern ℔		
Am't			Milling				℔					
Castings			Fitting				Am't			Am't		
Steel			Painting				Sold on the					
Brass			Carpenter				To					
Screws, &c.							In					
Am't			Am't				Profit					
Commenced			Ended									

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FIG. 6.—COST OF CONSTRUCTION.

Days' Work and Piece Work.

A simple form is employed as the workman's card, giving the various elements which go into the figuring of the wages item on a job done by days' work; while Fig. 4 does the same where piece work is employed. Fig. 5, a pink card, is used for piece work as referred to the article instead of the workman. Cards of this form are of course arranged alphabetically under the name of the product.

Cost of Construction.

In Fig. 6 we have a simple record of the principal items which enter into the construction of any machine. Drawing, patterns, material and wages are given.

In Fig. 7 is a form which bears on the other side a record of the Type, Machine No., Description, Mfr. Commenced, Mfr. Ended, Sold, Date, Buyer, Price; sufficient space being given for the insertion of items in full. Here we have the two different faces of a card on which is recorded the various items going to make up the actual cost of a machine made one at a time, as special order work. A record is kept of who bought it, and the price paid.

Teaming.

While the form was originally devised for a livery stable,

it can be very well used for the double purpose of controlling the movements of drivers and of charging to particular jobs the item of hauling, which has to be paid by some one, and might as well be charged up to the proper job. This form bears the "Date" at the upper left hand corner, followed by the "Team No." and "Driver." The columns following having the captions, "When," "Out," "Stop," "Back," "Remarks," and "Am't," which are sufficiently explicit to indicate the scope and purpose of the card.

Ledger Index Cards.

Another form is intended to keep and follow up the ledger

Type ____ No. of Pieces ____ Order No. ____

Mfrs. commenced ____ Mfrs. ended ____

Wages	Hrs.	$	c.	Material	lbs.	@	Amount	Résumé			
Planing				Casting				Drawings			
Forging				"				%			
Turning				Steel				Wood for Patterns			
Milling				"				Wages			
Boring				Iron				%			
Fitting				Brass				Material			
Tinsmith				Sheet Metal				%			
Assembling				Screws							
Painting								Wages			
Carpenter								%			
								Amount			
								Per lb. net			
								" " packed			
Amount				Amount							

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FIG. 7.—COST OF SPECIAL WORK.

pages of a customer from time to time as the pages fill up or the account is for any good reason transferred from one book to another. The form gives on the left hand side the name, business, city, street and number of the customer; whilst on the right, under the general heading "Amount," appear the "year," "vol." and "page" of the ledger account.

Installment Payments.

Where machines are put out on the instalment plan and messengers are employed to make the collections, a form is used in duplicate, one white and one colored. On the collection day the collector takes the colored ones and the white ones remain in the office. These cards bear the city, address, and name of customer, date of bill, amount, rate per week and date of first payment. The body of the card shows fifty-two columns numbered consecutively for the successive installments and these are followed by "Amount," "Paid," "Balance" and "Contract No."

In case a customer is in arrears, both the white and the colored card, that refer to him, are put in a special box, which serves as a "reminder" in the office. The messengers are given different districts each trip so as to prevent them fraudulently turning in as "in arrears" a customer who has paid. On the back of the card there may be entered which collector has had it for a certain month.

Stock Room.

It is unnecessary to recount the advantages of being able at any time to know the amount and character of stock on

Name ____ No. ____

Size ____ Price ____

Description ____ Depreciation ____

Maker

When bo't

Bo't from

Set up on the ____ of ____ 190 ____ Where

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FIG. 8.—RECORD OF DEPRECIATION AND INLENTORY.

hand. This can be accomplished by the use of cards arranged as shown by the following. The card is headed:

Description .... Dept

Type ..... Article ..... Place .....

On the left hand side of the card appears under the above caption:

IN

Date. Received From. Quantity.

and on the right hand side is a similar set of columns headed

OUT

Date. Rec'd By. Order No. Quantity. Quantity on Hand.

Where the articles are numbered, the cards are arranged in drawers or cases according to such numbers; otherwise alphabetically accorded to subject. Another card places more accurately the machine or job for which a given material is drawn. This has a similar heading but has the main columns headed respectively "Received," "Delivered" and "Quantity on Hand." The first two columns being subdivided by vertical lines for "Date," 'From," "Quantity," and "Date," "Machine No.," "Quantity" in each case. The last column "Quantity on Hand" giving of course the balance of machines in stock.

Inventory and Depreciation.

In inventory work, the name of everything that is not exactly in the nature of writing paper, account books, pens and ink, and the like—even for instance the firm signs, tables, chairs, desks, cupboards and cases—is to be inscribed on a separate card, on which all repairs, rebuilding, etc., must be entered. Hand in hand with the inventory goes the calculating and recording of depreciation and new value of each machine or other piece of property representing permanent investment. The form for this purpose has the heading:

No. ..... Description ..... Where.....

Under these are columns headed respectively and in the following order: "Date," "Value," "Date," "Repairs," "Am't," "Date," "Percent," "Depreciation" and "New Value."

Name ____ Worked at ____ as

Address ____ Age

Entered Employ ____ No. ____ Worked in ____ Dept.

Rates of Pay: Date ____ Rate ____

Left Employ on the ____ Cause

Remarks:

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FIG. 9.—PERSONNEL RECORD.

The reverse side of this card which has especial service in connection with the depreciation of machinery is illustrated in Fig. 8.

Personnel.

In every shop there should be a record of each workman, apprentice, or other employe—what he is, what he does, what he gets for doing it; his good and his bad points; where he lives, etc. This is of great help to either a new or an old foreman in re-engaging a former employe; and also, in laying off men. Fig. 9 covers the ground reasonably well.

At a meeting of the Pittsburg freight rate committee, held at Pittsburg, Pa., last week, a material advance in the tariff on coke was made, to become effective on Jan. 1. To all points east of Pittsburg the advance is horizontal, amounting to 10 cents per ton. From the Connellsville region to Pittsburg the freight rate has been increased from 75 to 80 cents; from the Connellsville region to the Mahoning and Shenango Valleys from $1.20 to $1.30 a ton; to Cleveland, from $1.50 to $1.60 a ton; to Chicago, from $2.50 to $2.65 a ton. Other points west have been advanced from 10 to 15 cents per ton.

Modern Foundry and Machine Shops at Castleton, Eng.

There appeared in *The Iron Trade Review* for May 9, 1901, an article on "A Progressive English Machine Shop." This described the methods practiced at the plant of Messrs. Howard & Bullough at Accrington, Eng., and dealt in detail with that excellently managed factory for the making of textile machinery. The plant at Accrington was for a number of years under the management of E. Tweedale, the firm also having the services of his brother, Samuel Tweedale and a Mr. Smalley as mechanical expert and in charge of sales. These gentlemen with their sons commenced manufacturing on their own account under the name of Tweedales & Smalley, at Castleton, near Manchester, and for the photographs and data of the past ten years progress in manufacturing lines there, we are indebted to a member of the firm, Joseph Tweedale, who has recently completed a business trip to this country, and H. G. McKerrow, the American representative of the company.

FIG. 1.—SOUTH WEST VIEW OF THE TWEEDALES & SMALLEY'S PLANT.

The location of the plant at Castleton is in the center of the cotton manufacturing district of England, within easy reach of Manchester and the famous ship canal to Liverpool, and the transportation facilities generally are unusually good. The Lancashire & Yorkshire Railroad runs its tracks directly through the town and the Rochdale canal, one of these waterways with which England is networked, is in parallel with the tracks. The first brick for the new plant was accordingly laid in February, 1892, and a start was made on a structure which with the original buildings and the numerous additions the growing business has made necessary, now covers 14 acres of land.

The main building is illustrated by Figs. 1 and 2, which represent respectively the southwest view of the front of the works and the northeast view. The main building is 760 feet long and the greatest depth, which is not uniform, is 576 feet. The railroad runs immediately in front of the works and there is a spur track extending from the main line into the plant. The switching in the yards is all done with the aid of an electric motor car. Since the building of the shop was commenced, the surrounding land to the extent of over 60 acres has been acquired so that there is an opportunity for a considerable extension in the future. The architecture of the shop is of the single story, with saw-tooth roof construction for the greater part, and as will be noted exterior lighting is limited to that admitted through the roof, the screw making department being the only exception. The semicircular arches which form so large a part of the outer wall of the building are not designed for the better lighting facilities of the shop but form the outer of two walls enclosing a couple of railroad tracks as seen in Fig. 3, which illustrates this interior view at the pig iron storage and charging floor. At this portion of the works a part of the building is sunk beneath the general level and in front of the building proper. The tracks run upon the roof of this lower portion and between the tracks, grids and trap doors open into the various storage chambers for sand, coal, etc. Thus the cars bearing these supplies can be run to the desired point of discharge and the load deposited through the bottom of the specially built car into the appropriate pocket. The platform seen at the left of the view is on a level with the charging floor of the furnaces and the pig iron and coke brought by the cars can be dumped on the platform in immediate proximity to the furnace door. The gases from the furnace are discharged into the square stack shown and the entrained ashes are trapped and fall to a receptacle by gravitation. This platform is connected by an elevator with the foundry, the latter covering 2¼ acres of land.

The Foundry.

The main foundry building is 360 feet long by 234 feet wide and is 23 feet in the clear from the floor to the roof beams. There are three furnaces having a melting capacity of over 100 tons daily. This structure is covered by a steel and glass roof and by means of a thorough system of exhaust fans the fumes and vapors which are inseparable from foundry work are in a great measure avoided. The lofty height of the room enables the atmosphere to be kept as clear as in a machine shop.

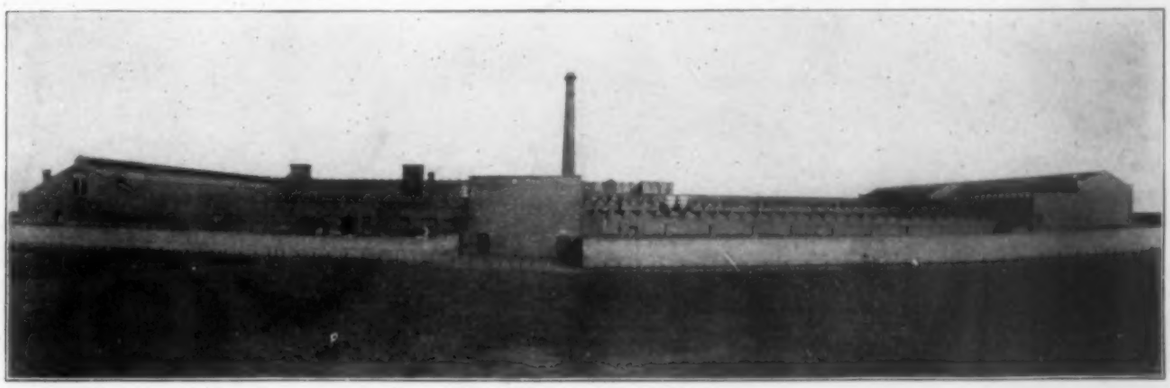


FIG. 2.—ANOTHER VIEW OF THE MACHINE SHOP AND FOUNDRY AT CASTLETON.

After the castings have cooled they are cleaned by the Tilghman process. This consists of an air blast system by which under strong pressure finely granulated particles of

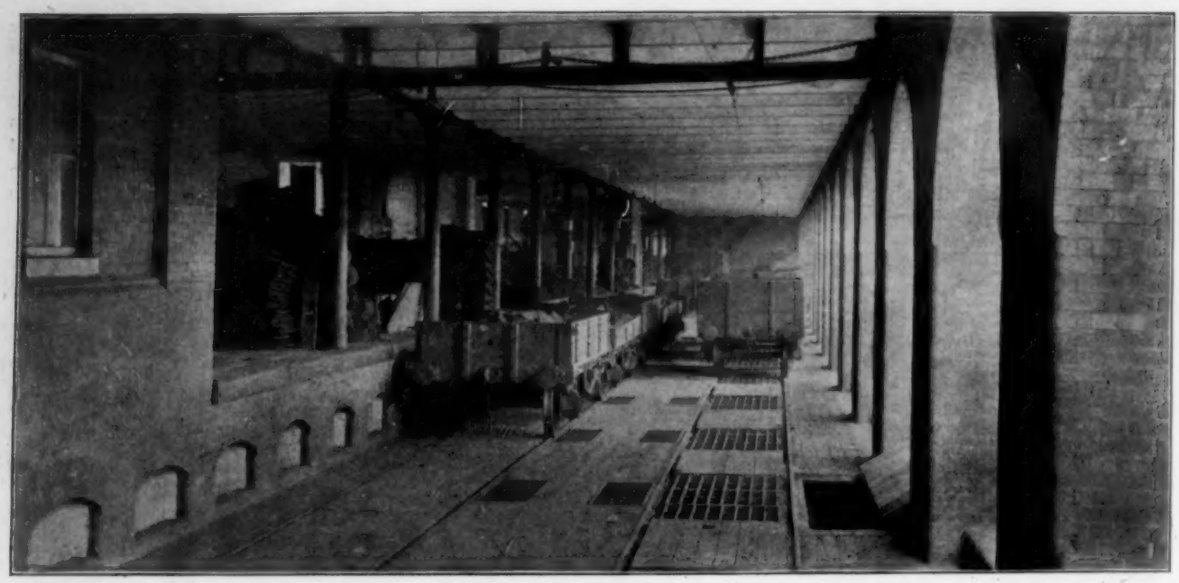


FIG. 3.—PIG IRON STORAGE, DISTRIBUTING TRUCKS AND POCKETS.

chilled iron are blown against the surfaces of the castings and the burnt sand and scale which adheres to the iron is completely and quickly removed. The method has enabled the firm to discard largely the old-time process of brushing and cleaning the castings and the commonly used pickle vat with its unpleasant and unhealthy surroundings is no longer requisite. Many of the molding machines are of well known types but some of the larger ones were made in the machine shops of Tweedales & Smalley and were specially designed for their particular use. A very complete arrangement of annealing ovens is employed but these are of the ordinary type and need not be described. The foundry is almost entirely on a piece work basis. Iron patterns are in general use and keep the castings up to a more uniform size and shape than would be the case with wooden patterns. That portion of the foundry which is used for the molding of carding engine and doffer cylinders is illustrated in Fig. 4. These are molded end up with an extra large gate on the end to ensure a sound casting. This extension is afterwards cut off on specially designed machines. There is an electric crane in use in this portion of the works for lifting cylinders and carrying metal from the furnaces to the mold. The crane runways are placed upon the top of the brick columns supporting the foundry, an arrangement which seems doubly strange in the light of the very general light steel construction of the roof throughout the buildings and the contrast to the methods as employed in this country.

The amount of lumber used in the woodworking departments, packing case manufacture, pattern making, etc., demands considerable space for its preservation as the storage must be ample to supply a total of some 2,500 tons per year.

Features of the Shop System.

The castings from the foundry are handled subsequently on a strictly interchangeable system. The parts are made to standard gauges and then distributed to the bins in the warehouses, each in its respective section, which is carefully labeled and numbered, so that when an order for a machine arrives and is entered upon the shop lists it is only necessary to pass in the requisite orders and imme-

FIG. 4.—CYLINDER MOLDING SHOP.

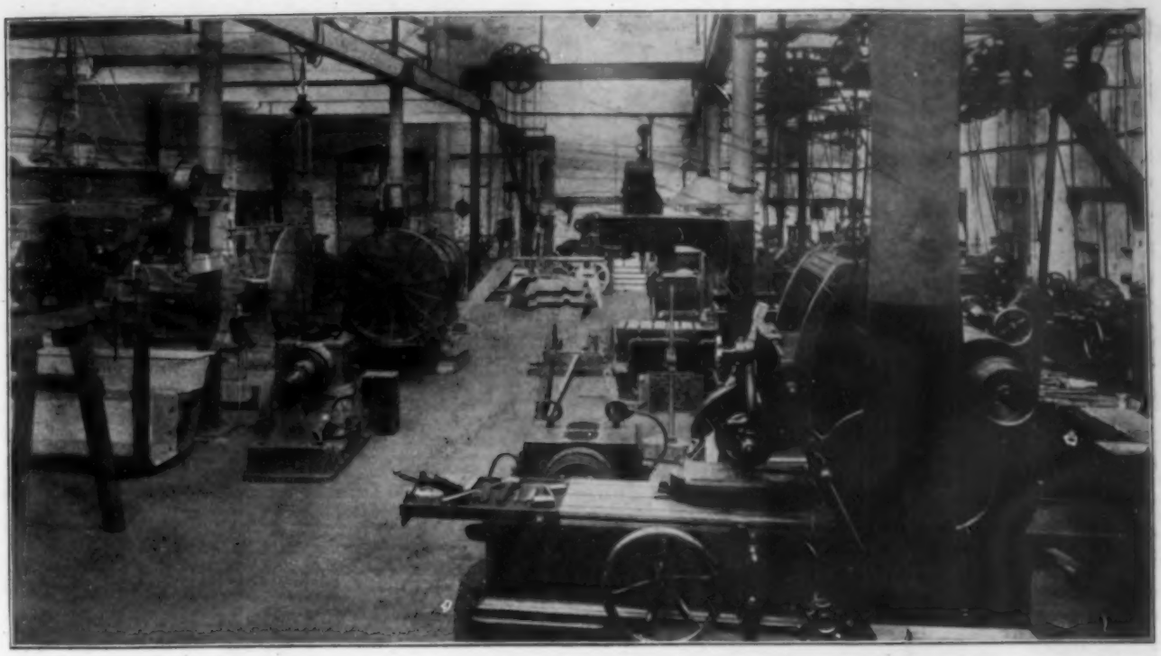


FIG. 5.—TOOL ROOM.

diately the necessary finished material is at once forwarded to the erecting shops.

The foundation of such a system is based upon an adequate tool room charged with the task of maintaining all the standard sizes of the shop in an accurate condition. The tool room of the plant is seen in Fig. 5 and here all the milling cutters, lathe and planer tools are made and kept in good condition. It is worth mentioning here that the firm is opposed to the adjustment of the cutting edges by the workmen, and tools when dull or in any other unsatisfactory condition are returned to the proper department for treatment and another is at once in possession of the operator at the machine. This room contains some of the most expert mechanics of the company and here the entire shop system of duplicate part manufacture is handled. A great many of the tools employed are of American manufacture but in the photographs, as in other views, preference has been given for illustrative purposes to those showing views more or less at variance with machines or practice familiar on this side of the Atlantic. In this connection, however, it may be pointed out that upwards of $50,000 is invested in American tools in the plant. A Walker chuck is to be seen in the foreground of the picture on a grinding machine. This is of the well known electrically operated type and in this particular instance is doing work at a considerable distance from the old Bay State. A very complete system is employed with regard to the maintenance of the sizes in the shop. There is a master set of templates and gauges under seal in the office from which the tool room set and the working standards for the shop are periodically tested, and except at such times as these tests are being made the master set of templates is not employed but is simply kept as a standard for ultimate reference and correction. All the gauges and templates used by the machinist are made from these standards and the system throughout is claimed to limit the range of error to less than two one-thousandths of an inch in the regulation of the shop product.

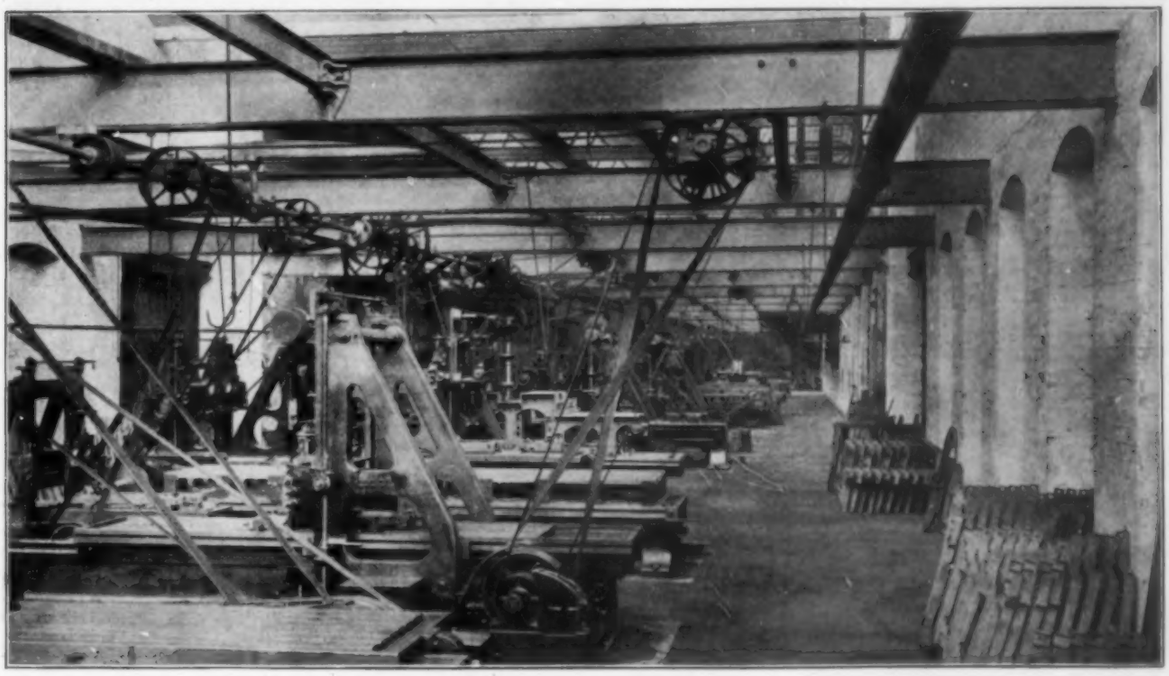


FIG. 6.—PLANING DEPARTMENT.

FIG. 7.—ERECTING ROOM.

The planing department shown in Fig. 6 is noteworthy because, out of the several illustrations, a clear representation of the overhead work, both beams and countershafts, is here given. These tell their own story and it is but necessary to add that some of these planers were manufactured in America. The flat card erecting room is shown in Fig. 7 and here also is illustrated the typical turning lathes employed in the fitting shops abroad. The lathes have neither feed gears nor lead screws and even with these disadvantages threads are cut, starting with diamond point and finishing with chasers, and some heavy turning is often handled. The writer has seen a lathesman with one of these lathes cut bearings on 1½ inch square shafts, the shafts being about 9 feet long and the bearings about 4 inches respectively. This work is accomplished with the primitive heel tools seen on the beds of the lathes and some account of these aids to lathe production was given in *The Iron Trade Review* for Nov. 14, 1901. The steady rest shown on the lathes is formed of two pieces of metal or wood having in each half a semicircular bearing for the shaft resting on the centers of the lathe. These rests slide in grooves of the bracket resting on and bolted to the bed of the machine tool. The bracket is in two pieces and a bolt passing through the two slots enables a quick adjust-

FIG. 8.—GRINDING AND GLAZING DEPARTMENT.

ment for the different diameters of work. It will be understood of course that the bearings are changed for the different sizes of work.

The Grinding Department.

The grinding and glazing department illustrated in Fig. 8 will prove considerable of a novelty to a reader who has no previous experience of English shop practice. Such a department plays but a small part even in the textile machinery making shops of this country. The bright finish which is so characteristic a feature of the textile machinery built on the other side is obtained in such a department. Whether the bright finish really is any better than paint is highly debateable and need not here be discussed. The English manufacturer claims that the finish not only looks better but enables the machinery to be kept cleaner; in this country a more liberal use is made of the paint pot. On the right hand side of the room is a series of polishing or glazing wheels. These are leather covered discs surfaced with an emery coating over the rim. On the left hand side of the room is a row of grindstones and when these are installed they are about seven feet in diameter and about 16 or 18 inches thick. These are handled by the traveling crane running on the narrow gauge runway overhead and the workmen acquire a remarkable skill in handling these masses of stone. Immediately in front of the stone is a block of wood on which the grinder sits or stands as he may alternately grind metal or chip the surface of the stone to get a better working condition. Chipping the stone is accomplished with an adze-shaped tool with which the workman cuts shallow grooves diagonally across the surface.

During this operation the belt is off the driving pulley of course and the workman turns the stone a short distance with his foot alternately with the making of the cuts. When the stone is dressed to his liking, he takes a position astride of the block of wood already mentioned and over the thin board which reaches from the stone to a leather support which in turn is held by a chain, rod and grooved pulley from an overhead runway. The workman can use this board to press down upon the work held against the stone and by bringing his weight to bear on the board considerable pressure is obtained. When the work is heavy the weight of the metal is sufficient to assist the grinder but at other times this sliding support is used with dexterity and success. One of the most remarkable things about the room is the thoroughness with which the dust has been controlled. A quantity of sand, emery and metal in very fine particles is constantly removed from wheels or work and this is removed and the atmosphere kept in good condition. A pipe runs under the floor and in back of the machines with an opening near each glazier. In the center of the shop a tube runs to the roof and this is connected with a receptacle which collects the dust and allows the air to escape. The air is of course drawn into the pipe at each of the glaziers and there are two large fans which take about 12,000 feet of air per minute from a room which has a capacity of 231,660 cubic feet, the air being completely changed about every twenty minutes. The machines are all driven from beneath the floor.

Power Equipment Features.

The engine room is seen in Fig. 9 and presents a crowded appearance with the dynamos and switchboards. The total power required in the shops is about 1,000 horsepower, of which 750 horsepower is electrical. The dynamos are driven, and power is taken from the rim of the flywheel, by means of ropes. The engines are of the triple expansion type. A storage battery system of some extent is also installed which is employed to help out when the dynamos are overloaded. The motors in the different departments of the shop can also be run from this storage battery which also supplies the lighting during the night as well as the electrical power required by the cars on the spur tracks, etc. Power is also taken from the same source for the driving of the cranes, hoists, etc., throughout the works. A group or department system of driving is employed as being more satisfactory and less expensive than individual drives. Lately the firm has been considering the question of installing an entirely different system; the idea being to put in apparatus for the manufacture of a cheap gas and use this for a number of explosive motors, the plant being piped off in each department for such a purpose. This is a novel departure and the outcome of the installation will be watched with considerable interest by shop managers generally.

The entire number of men employed is from 1,800 to 2,000, according to the condition of business. Most of these are paid on a piece work basis. The firm is what might be termed a close corporation, having no outside

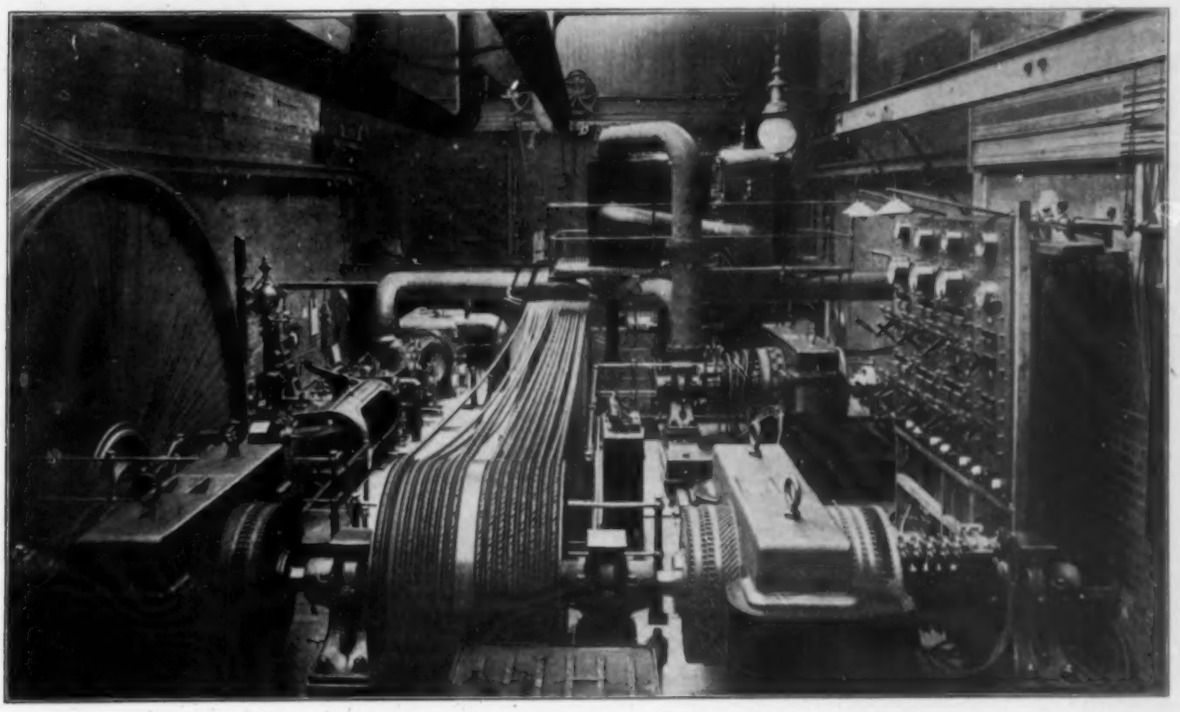


FIG. 9.—POWER PLANT.

capital invested, but the men when so deserving are encouraged to purchase stock and in many instances a $1,000 worth of shares is first assigned, the returns going toward the payment of the stock with any additions that the employe may be able to make. A number of the workmen have their earnings thus invested and the arrangement is claimed to be mutually satisfactory in every way. A club house is located near the works which the firm built primarily for the use of the men but the membership is not limited to the employes of the works. There is here every facility for indoor and outdoor recreation; the two story building has a large and well lighted billiard room, reading room, etc., and outdoors there is a finely kept and leved expanse of lawn where the English game of bowls may be played.

THE MILLER IMPROVED GAS ENGINE.

This engine might properly be termed a double four-cycle type so timed that one impulse every rotation of the crank shaft is obtained. The latest improvements consist in a balance exhaust valve which opens against the pressure and closes in a corresponding manner. The upper end of the valve stem is fitted to a piston which works in a chamber opening upward, the valve proper seating against the lower part of the explosion chamber, so that every time it is subjected to the heat of an explosion it is alternately exposed to a draft of cool air entering the engine which counteracts the effect of the heat imparted to the valve stem. This treatment does not allow

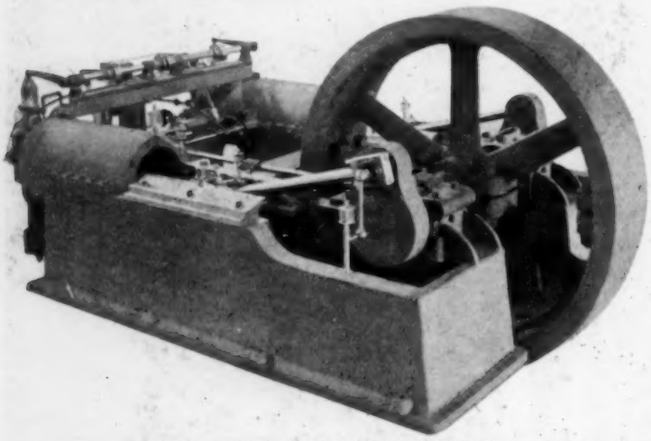


FIG. 1.—MILLER IMPROVED GAS ENGINE.

the stem to become overheated and ensures a long working life. The stem being guided from above by the piston working in the chamber and surrounded by a circulation of water it can be thoroughly lubricated and maintained in good condition.

The inlet valves are placed on the side of the cylinder and are operated by the suction and have vacuum cups that control the easy and quiet seating of the valves. The governor is equipped with a piston controlled by the vacuum created by a small air pump running in connection with the engine and from this vacuum the speed of the engine is maintained.

The mixing valve which is also a part of the governor is so arranged that it will open up a passage for air and one for gas, the two having direct access to the same vacuum chamber and each being of a proper size to admit and maintain a uniform mixture of gas and air regardless of what the requirement may be and thus enable the governor to administer the proper mixture at all times. The compensating valve is a device that automatically admits or ejects air, as the case may be, to compensate for the requirements of the gas as it may change in its quality.

There is an air filter chamber through which the air passes to act upon the piston in the governor and the object of the filter is to clear the dust from the air where it would otherwise clog up the needle valve that controls the throttling and thus cause the engine to lose speed. The jump spark is employed for igniting the explosive mixture and the company has devised a new sparking plug which is claimed to be indestructible. This type of engine is manufactured in many sizes (units up to 250 h. p. being in operation) by the Miller Improved Gas Engine Co., of Springfield, O.

Sheffield Car Co.'s New Plant.

Plans have been completed for the plant of the Sheffield Car Co. at Three Rivers, Mich., which has previously been mentioned briefly in these columns. The company is a branch of Fairbanks, Morse & Co., of Chicago. The factory will be 90x100 feet, one and two stories high, fireproof construction. There will be a central section 40x250 feet, to be used as a molding floor. On one side of this will be a section 25x250 feet, to be used for the manufacture of car wheels; also a section of the same size to contain two cupolas, each of 20 tons capacity; a coal room with core oven, 12x16 feet; the room for machine molding for light work; also laboratories for employes, and a cleaning room 50x90 feet in size. The equipment will include a 5-ton electric crane with three smaller traveling cranes on the wheel floor, which will cover the full length of the building; also several jib cranes for special work.

There will be a complete system of railway trucks, extending through the buildings, and the foundry will be connected with the machine shop by an electric railway. There will also be an especially devised system for the handling and mixing of sand.

Cordwood in excess of 100,000 cords is now piled up along the tracks of the Marquette & Southeastern railroad, ready to be hauled to Marquette, Mich., for use in making

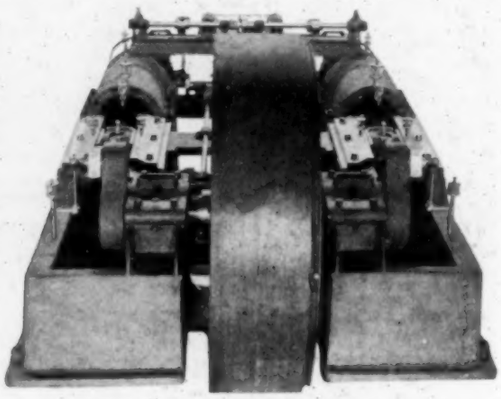


FIG. 2.—END VIEW OF MILLER GAS ENGINE.

charcoal for the Pioneer Iron Co.'s blast furnace soon to go into commission and for the company's Carp river furnace, also located in Marquette. It will require 6,400 cords of wood to charge the eighty kilns at the new furnace, each being of eighty cords capacity, and with the plant in operation 225 cords daily will be required, or the capacity of three kilns. The furnace is owned by the Cleveland Cliffs Co. interests, the Pioneer Co. being a subsidiary corporation.

The Kokomo Co. and Pittsburg Plate Glass Co. are making scientific tests of the peat beds near Kokomo, Ind., with a view to using peat for fuel instead of coal. There are thousands of acres of peat in Indiana.

Four new clam-shell unloading machines are to be erected within the next few months on the Pittsburg & Conneaut docks at Conneaut, O. The machines will be of the Hoover & Mason type and will be put up on dock No. 4.

The Oliver Iron Mining Co. is going into the lumber business on a large scale, having big camps at Marinette, 25 miles east of Bessemer, in full operation. Two hundred lumber jacks and fifty teams and teamsters will be employed all winter getting out timber for the company's Bessemer and Ironwood mines.

A SYSTEM FOR HANDLING INDUSTRIAL ADVERTISING.

The handling of advertising is by no means the haphazard affair of some years ago. The expense of an effective advertising campaign is too great to allow of any desultory measures and do justice to the business and the appropriation. In spite of this well understood requirement, the press seldom gets the conscientious care given to the other selling forces of the firm. The benefits of publicity in a trade journal circulating among prospective purchasers are rarely sustained and followed with the persistency with which the other drummers are handled. Perhaps the fear that a system of handling advertising details will of necessity become unwieldy in actual use has often been a bar. Certainly little attention to it is paid in the reading columns of the trade press and even in the pages of papers claiming to have a close supervision of advertising practice there is a dearth of information on advertising in mechanical and other branches of engineering. For these reasons the following account of the system used by F. L. Hutchinson of the Christensen Engineering Co., of Milwaukee, Wis., will prove of interest and value.

The method by no means exhausts the possibilities in this direction. It does not go into the subject to the extent to which the firm doubtless follows the salesmen and other selling agencies. Yet it covers in a simple and effective way the relations between the manufacturing company and the trade journal and is equally effective in the case of a small concern as in that of a large one. The forms required are few and explicit, and will avoid a vast amount of uncertainty and annoyance.

Figs. 1 and 2 represent the front and back of the one card, which in the original is 7x9 inches, and is employed for keeping a record of all cuts and electrotypes owned by the company. The form is also employed for keeping track of the movements of the cuts, when and where sent, as well as their location, etc., when retained in the possession of the owners.

The method of handling the cards illustrated in Figs. 1 and 2 may be briefly outlined: When a new cut is received from the engraver, a proof of it is also obtained and pasted on the form. The negative from which the cut was made already has a number and this designation is also assigned to the engraving. The cut number and the title of the subject are then inserted in the blank spaces on the form; as for example, "35", "Motor, D. C., 10 H. P., 220 volts." The engraving is then placed in one of the drawers of the electrotype cabinet and the drawer number inserted in the space provided on the form. The number of electrotypes is also inserted as indicated on the sample form. For instance, Mr. Hutchinson may order one halftone engraving and four electrotypes of the cut. When these come to hand and are filed away in the cabinet, the figure "4" is placed after the words "No. of electrotypes."

It is quite within the range of possibility that all the electrotypes may be sent out to trade papers for advertising purposes and a demand may arise for another electrotype. Thereupon a requisition is sent in for whatever number of electrotypes may be required and when these are received the number in the upper right hand corner of the form is changed to agree with the correct total of the electrotypes which have been made off that particular cut.

These forms are supplemented by a stout card 7x8¼ inches. One of the longer edges has two lines occupying a space of about ¼ of an inch, this is used for keeping track of negatives and the two lines are arranged as follows:

Negative No..... Subject.....

.....

A blue print is readily made of the negative and then pasted on the blank so that if any one desires to ascertain if the firm has a photograph of a certain part of a machine, he does not have to look over the negatives themselves or wade through a pile of photographs in various conditions and degrees of handiness for examination, but can at once refer to the alphabetical files of a convenient card index and see what negatives are available.

Returning to Figs. 1 and 2, it will be understood that these forms are also filed alphabetically according to subject matter, so that in the event of any one desiring to see a proof of a machinery cut he can turn to the file of cuts and find proofs of all the cuts on that subject, filed together and ready for convenient inspection. On the back of the form is also kept a record of every electrotype sent out to the printer of a trade journal and when a cut is returned credit is given.

The system is simple, but like any other business aid, must be followed closely and accurately to be of service. If any electrotype, for example, is sent to *The Iron Trade Review* and not charged up on the back of the form, the record already in place and full force will testify that the electrotype is still on file in Drawer No. ..... and upon looking for it, in hopes of making a shipment in a hurry, the usual fault finding with the system (?) will occur.

Mr. Hutchinson uses the 20th Century Unit Electrotype Cabinet made by The American Type Founders Co. of Chicago. Each unit contains eight drawers of the exact depth required for halftones and electrotypes. These units can be purchased one at a time and built up into a cabinet as the number of engravings increases.

A book is kept in addition to the above records and this contains the numerical list, recapitulating the engravings and commencing with No. 1. The company's negatives, cuts, etc. were not numbered when this book was started and Mr. Hutchinson began by assigning "No. 1" to the oldest negative and continuing up to the latest photograph. Only one number is placed on a line and the subject is located directly to the right of the number. In another column further to the right is inserted the date the negative was made and the date the cut was ordered.

SENT TO	Date Sent		Date Returned		REMARKS
Iron T. Review	*Jan.*	*1*	*Feb.*	*2*	*Broken*

FIG. 1.—7 X 9 CARD FOR KEEPING TRACK OF CUTS; WHEN AND WHERE SENT, ETC.

Cut No *61* **Subject** *Motor* **in Drawer No** *6*

Number of Electrotypes *10*

FIG. 2.—BACK OF FIG. 1. CUT NUMBER, SUBJECT AND LOCATION, WITH NUMBER OF ELECTROTYPES.

In many cases, of course, no cuts have been ordered but at any rate this numerical record shows at a glance whether a cut has ever been made from any particular photograph already in the possession of the company. The system is equally serviceable in reproductions from other sources and in case an engraving is made from a drawing of which there is no negative, as in line work, for example, it receives a number in the usual way and then the column headed "Date Negative Was Made" is left blank. This shows at a glance that the cut so designated was made either from a drawing or possibly from a photographic print of which there is no negative in stock.

A record is kept of advertisments on the form shown in Fig. 3. This card in the original is 5x7½ inches. As soon as a contract is signed for any advertisement, for whatever time, the portion is filled in above the double line (in the original this is printed in red) and at the same time appropriate dates are inserted in the columns headed "Date of Issue" and "Send Copy." If the date of issue should be Jan. 1, the column following would be filled in "Dec. 10." This would indicate that on Dec. 10th the copy must be sent for the advertisement in order to be in plenty of time so that the publisher can set it up, send back a proof and allow the advertiser or his representative sufficient time to make any corrections which may be necessary and return a proof in good season to the publisher. These advertising cards are filed in a binder and examined each Monday morning so that copy shall be promptly placed for each advertisement which should receive attention during the week. As soon as the copy is prepared and forwarded the column headed "Copy Sent" is filled in with the date.

The column headed "Space" is filled out at the same time. The Christensen Engineering Co. has contracts with some papers calling for a certain number of inches of space within the year and in such cases the advertiser may use six inches in one issue and twice that amount in the next. The column headed "Remarks" usually contains the number of the cut which is to appear in that advertisement.

The copy is now on the way to the publisher and a record of the material sent and the requirements is on file. Further additions to the record are deferred until the proof is received by the advertiser and when this is thoroughly satisfactory the date that the proof is returned is inserted in the column marked "O. K." Should there be any changes made however, the date the proof is returned is inserted in the column marked "For Correction," thus indicating that the proof was not approved in the form in which it was originally returned. If the publisher submits a second and corrected proof, it is again returned and the date inserted in the column bearing the caption "O. K."

Fig. 3 plays an important part in the checking of b received for advertising. These are compared with th dates of publication, the space used as well as the price printed above the double red line on the card. When the bill is O. K. a bracket is placed around the dates of issue enumerated in the bill and the date and amount of bill are entered in the appropriate columns. This is of course followed by the advertising department approving the bill and passing it over to the auditing department for payment. The form shown in Fig. 3 is thus a complete record from the time a contract is signed until the advertisement has appeared and the bill is finally approved for payment.

The advertising department also keeps a scrap book in which are preserved proofs of the advertisements. It is arranged similarly to a loose leaf ledger and maintained in alphabetical order according to the names of the different trade papers involved. The date the advertisement appeared is marked alongside the proof in the book. If the advertisement, for instance, should appear for several consecutive issues in *The Iron Trade Review* each of these dates accompanies the proof. The advertising department compares the advertisement as published when the paper is received with the form shown in Fig. 3 to see that the proper space, etc., has been used; so that if the system is followed as here outlined it is impossible to approve an incorrect bill.

This system is the outcome of an experience in various advertising methods with other companies and was designed to meet the conditions under which it is now operating and doing excellently. The requirements seem to have been so skillfully met that one can easily credit the assertion that since starting the system there has not been a case where the advertising department could not obtain the information sought from the records at hand. One fact should not be ignored: The explanation may appear long and consequently the reader may be led to believe that too much time will be required in the keeping of the record but a close scrutiny of the system does not bear out this view. On the contrary, it is believed that the work involved is very slight in proportion to the benefit to be derived and the actual labor required is aided to such an extent by the ingenious arrangement of the cards employed by Mr. Hutchinson that the device is as strong as it is brief, convenient and easy in operation.

Advertising Department—Christensen Engineering Co.

RECORD OF ADVERTISEMENTS.

Name of Publication.....*The Iron Trade Review*.....

CONTRACT { Begins.....*Jan. 1, 1903*..... Expires.....*Dec. 31, '04*..... Space .....*¼ page*..... Price.....*$321.75*.....

COLUMNS { No. on Page..... ..... Width of " .....*6¼ in*..... Height.....*11 inches*.....

Address { .....*Rose Bldg*..... .....*Cleveland, Ohio*.....

Period of Issue.....*Weekly*.....

Ads may be ...*1*, *2*...or...*3*.....Cols. wide.....*2¼"*.....Key Nos.....*Catal. 11*.....

Date of Bill.	Cost.		DATE OF ISSUE.		Send Copy.	Copy Sent.	Space.	Remarks.	Proof Returned	
									For Cn.	O. K.
April 1	*80*	*44*	*Jan.*	*1*	*Friday*	*Thursday*	*8¼"*	*All copy must be in by*	.....	✓
July 1	*80*	*44*	.....	.....	.....	.....	.....	*Saturday of each*	.....	.....
Oct. 1	*80*	*44*	.....	.....	.....	.....	.....	*week for next issue.*	.....	.....
Dec. 31	*80*	*44*	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

FIG. 3.—ADVERTISING RECORD. ORIGINAL SIZE, 5 X 7½ INCHES.

The Pittsburg Iron Market in 1902.

BY A. O. BACKERT.

A year of unparalleled prosperity for the iron and steel trade of this district has just come to a close, and the future, except in a few highly finished lines, could not be brighter. Demand for the heavier forms of finished steel has greatly exceeded the supply, and while increased capacity under erection and projected is prodigious, there is little relief in sight for consumers before late in the year. The demand for pig iron has likewise exceeded the capacity of the furnaces, and as in steel the foreign markets were heavily drawn upon to relieve the situation. Prices of raw material advanced sharply throughout the year and efforts to check the market proved futile. On some of the finished lines the existing agreements among the larger steel producers were a powerful influence in maintaining prices at a conservative level. Prices on steel billets presented the anomaly at various periods throughout the year of selling above the quoted prices for plates, bars and structural material.

The year still further demonstrated the need of independent producers, of finished material controlling their supply of raw material; and the greater part of the new capacity under erection and projected in pig iron and steel, is for the purpose of further fortifying the smaller independent manufacturers. Properties containing millions of tons of ore in the Lake Superior region and extensive coal properties in Pennsylvania and West Virginia have also been taken up for the purpose of further securing the position of competitors with the constituent companies of the United States Steel Corporation. The selling policy of the latter has also been still further outlined, and in all lines where competition was keenest reductions were made to hold the trade.

Additional pig iron capacity, which became available during the year did not keep pace with the additions to the steel producing capacity of this district. The increase in the steel capacity amounted to 925,000 tons annually, while the pig iron capacity only increased 500,000 tons. Steel plants under construction will further increase the steel capacity of the district 650,000 tons annually during the coming year, while the 13 blast furnaces under erection and projected, together with those being enlarged, will increase the annual output 1,750,000 tons. Much of this pig iron capacity should have been available during the past year, but owing to the crowded condition of the shops of the engine builders it was impossible to secure power for the plants. Two additional rod mills with a daily capacity of 800 tons were placed in operation in the past four months, while the merchant pipe capacity has been greatly increased by independent producers. In the sheet trade there is sufficient capacity to produce 1,000,000 tons annually while the present consumption is little more than 500,000 tons. In the tin plate trade likewise the producing capacity is practically double the consumption, while the wire trade is also suffering on account of excess capacity. In these three lines the competition promises to be keen this year, and many mills will be compelled to shut down.

The policy of the United States Steel Corporation to conserve its natural resources caused the withdrawal of the H. C. Frick Coke Co. from the general market; and the withdrawal of such a great tonnage resulted in almost doubling coke prices for 1903 as compared with the contract prices for the previous year. That there will be sufficient coke for all before the end of the year is indicated by the number of ovens under erection at present which will increase the annual producing capacity in 1904 fully 12,000,000 tons.

The railroads serving this district have caused blast furnace operators to sustain great losses and indirectly steel consumers have suffered. The yard facilities of this district are fully one-half too small to handle the incoming and outgoing tonnage, and the railroads have not had sufficient cars nor motive power. The Wabash Railroad will offer some relief when it commences operation, but this will not be for six months at least. The Jones & Laughlin Steel Co., in order to lessen the cost of ore transportation, has surveyed a road from Pittsburg to Lake Erie, while the United States Steel Corporation will further facilitate the handling of its products by double tracking the Bessemer & Lake Erie railroad. Another line was projected by the Union Steel Co., but its absorption by the United States Steel Corporation prevents the carrying out of that project.

Powerful independent competition on the part of the Union and Sharon steel companies was wiped out by the absorption of the plants two weeks ago by the United States Steel Corporation. Whether this will interfere with the improvement plan outlined for the corporation plants in this district has not yet been indicated, but it is probable that it will interfere to some extent with the erection of several furnaces and a large open-hearth plant, the latter to have been erected at Homestead. The expenditure of several million dollars for a tube plant at McKeesport, Pa., will not be interfered with.

Labor troubles did not play an important part in the past year's events. The scale with the Amalgamated Association was adjusted early in the year, while other labor disturbances were of little consequence.

Increases in Producing Capacity.

By the completion of new furnaces, and the enlargement of others, the pig iron production of the territory within a radius of 70 miles of Pittsburg has been increased 500,000 tons annually. Of the new furnaces that were blown in during the year two are the properties of the Natural Tube Co. and the Carnegie Steel Co. respectively, the furnace of the former being located at Benwood, W. Va., and that of the latter at Rankin, Pa. The third is a small furnace at Sharon, Pa., the property of the Northside Iron Co., with an annual capacity of 18,000 tons. It is now idle. The two Isabella stacks of the American Steel Hoop Co., which were in course of reconstruction for more than a year, were blown in in July, their daily capacity having been increased from 500 to 800 tons. Within this territory there are 13 furnaces either under erection or for which contracts have been let and which will probably produce during the year. Three of these stacks will be placed in operation within a few weeks, while the remainder will be blown in at different periods during the year. In addition three stacks are being reconstructed and will be blown in again early this year.

The increase in new capacity will amount to 1,500,000 tons a year, while reconstructed furnaces will have increased outputs amounting to 250,000 tons, making a total of increased capacity available within a year of 1,750,000 tons. The two stacks which the Carnegie Steel Co. has under erection at its carrie and Edgar Thomson plants respectively, will be blown in within a month. The Clairton Steel Co. also anticipates blowing in one of its three furnaces before the end of January, while the remaining two will come in about the middle of the year. At Sharon, Pa., the Sharon Steel Co. has two stacks under erection, while at Sharpsville, Pa., the Shenango Furnace Co. will erect two 400-ton stacks that will be completed within the year. At Youngstown, O., the National Steel Co. is adding one 600-ton stack. The Union Steel Co. will complete its two 500-ton stacks at Donora, Pa. in 1903, and the Monongahela Iron & Steel Co. contemplates the early completion of its 150-ton stack which will be erected at Hays Station, Pa. The LaBelle Iron Works will shortly blow in its furnace, which has been entirely rebuilt and the output increased from 200 to 400 tons daily, while the National Steel Co. is increasing the output of two of its stacks at New Castle, Pa. The United States Steel Corporation improvement program,

in addition, calls for the erection of two additional furnaces at Duquesne, Pa., one at Youngstown, O., and one at McKeesport, Pa. Whether the erection of these furnaces will be given up in view of recent acquisition of the Union and Sharon properties is not announced.

Pig Iron.

Pig iron prices advanced $7 to $8 per ton during the year, and the advances that could be noted on some orders for prompt shipment would be still greater. The output of the furnaces of this district was greatly curtailed owing to interference with the coke shipments, and almost throughout the entire year furnaces, not only in the Mahoning and Shenango valleys, but directly in this district were compelled to bank from time to time owing to the failure of the coke supply. The Bessemer iron output of the merchant furnaces in the valleys was curtailed nearly 500,000 tons, and nearly three months tonnage will be carried into the new year that should have been delivered during the last quarter. The operation of the steel corporation furnaces in this district was also curtailed. Owing to the scarcity of Bessemer iron, contracts for fully 100,000 tons of English Bessemer were placed about three month ago, shipments running to July of 1903. One large steel producer purchased 50,000 tons, while the contracts placed by other steel mills varied from 10,000 to 15,000 tons. This iron will be delivered into this territory at somewhat lower prices than those ruling for domestic iron, and despite its high silicon it can be worked to advantage when mixed with the product of the domestic furnaces.

In January Bessemer iron from prompt shipment sold as high at $17.25, Pittsburg, while the United States Steel Corporation purchased 100,000 tons for second half delivery at $16.50. In February the corporation again purchased Bessemer for third quarter delivery at $16.75, and in April it covered requirements for the last quarter and the first quarter of 1903, amounting to 225,000 tons at $17.25, Pittsburg. The market continued to advance until in May prompt iron was sold as high as $20.25 at the furnace. Owing to the strike of the blast furnace workers early in June, 16 furnaces in the valleys were banked for about ten days, curtailing production fully 40,000 tons. In this month independent steel producers purchased upwards of 125,000 tons of Bessemer for delivery the last quarter and the first quarter of 1903 at $20 at the furnace, which was an advance for this delivery in two months of $3.50 per ton. During the latter part of the year prompt iron in small lots was sold as high as $23 and $24, Pittsburg, while for delivery the first half of 1903 large tonnages were contracted for at $21.25 to $21.50 at the furnace.

Basic iron advanced about $4 during the year, and owing to the inability of the valley furnaces to take all the tonnage offered, Virginia furnaces provided iron for many of the smaller open-hearth plants.

The supply of domestic foundry iron has not been nearly large enough to meet the demands of consumers, and some foreign iron was brought into this district from time to time, but the tonnage was not nearly as great as that brought into other large foundry districts of the country. No 2 foundry iron sold at $16.25, Pittsburg one year ago, but present prices for immediate shipment range from $23 to 23.50. During the first half the market advanced sharply and the second half of the year had hardly been entered upon when consumers began to cover their requirements through the first half of 1903. Northern furnaces producing foundry iron are practically sold up through the first half, but it is believed that prices will decline somewhat during the second half, owing to increased furnace capacity. The advance on forge iron was not so marked as on the other grades, probably for the reason that many furnaces, being compelled to bank frequently, produced considerable off iron which answered the purpose of forge iron consumers.

New Steel Making Capacity.

The steel producing capacity of this district has been greatly increased during the year. New plants that have become operative within a radius of 70 miles of Pittsburg have a daily output of 3,000 tons or an annual capacity of 925,000 tons. This increase is the greatest on record for a twelve month period and the additional capacity that will become operative this year within this limited territory will have an annual capacity of 650,000 tons. In the new capacity that added to the output of the year, only one Bessemer converter can be recorded, this having an annual output of 150,000 tons. The remaining 775,000 tons increase was open-hearth capacity. All the plants that will come in this year will make open-hearth steel exclusively.

Among the plants that first produced during the year are the following: LaBelle Iron Works, Steubenville, O., six 50 ton open-hearth furnaces and four additional furnaces are projected; Talbot furnace of the Jones & Laughlin Steel Co. with a daily capacity of 400 tons; additional Bessemer converter installed at South Side plant of the Jones & Laughlin Steel Co, with a daily capacity of 500 tons; Clairton Steel Co., Clairton, Pa., twelve 50-ton open-hearth furnaces; Sharon Steel Co., Sharon, Pa., four 50-ton open-hearth furnaces added to the eight furnace plant; Firthsterling Steel Co., McKeesport, Pa., one 5-ton open-hearth furnace. Those under erection are as follows: Sharon Steel Hoop Co., Sharon, Pa., four 40-ton open-hearth furnaces, will be in operation during the second quarter; Union Steel Co., twelve 50-ton open hearth furnaces, will be in operation late in the year; Wheeling Roofing & Cornice Co., Wheeling, W. Va., one 35-ton furnace will be in operation in a few months; Youngstown Iron Sheet & Tube Co., Youngstown, O., six 50-ton open-hearth furnaces probably to be finished in the third quarter; Vulcan Crucible Co., Aliquippa, Pa., one 10-ton open-hearth furnace to be in operation in a few months.

Billets and Rods.

Both Bessemer and open-hearth billets and sheet bars ruled high throughout the entire year. Many finishing mills were compelled to purchase large tonnages from German mills. The smaller independent plants were not the only sufferers on account of the steel shortage. Such large producers as the Jones & Laughlin Steel Co., Carnegie Steel Co. and the Republic Iron & Steel Co. were compelled to purchase steel in the open market at different periods during the year. The Republic Iron & Steel Co. also availed itself of the foreign supply, but none of the material was shipped to the company's mills in the Youngstown district. It is estimated that the total purchases of foreign steel by mills in this district during the year will amount to about 50,000 tons. Bessemer billets early in the year were quoted at $28, at mill, but in March the market advanced to $30 and then to $32, while in July, sales were recorded as high as $34 per ton. During October and November the market declined somewhat but in the past month Messemer billets were held uniformly at $29 and $30. Open-hearth billets advanced from $29 to $35 but in the last two months a large tonnage was placed at $31. German billets, delivered Pittsburg, varied in price during the year from $29 to $31.50, but the greater part of the tonnage brought into this district was at the lower figure. Independent sheet and tin plate manufacturers suffered on account of the scarcity of domestic sheet and tin bars, and while there was considerable buying of foreign material to make up this shortage, the mills experienced considerable trouble in using the steel.

Three additional rod mills were placed in operation during the year. The mill installed by the Jones & Laughlin Steel Co. was operative less than three months, when it was decided to take it out on account of trouble in its operation. Orders calling for 20,000 tons of material were turned over to the American Steel & Wire Co. The other two mills were placed in operation by the Union Steel Co. and the Pittsburg Steel Co., having a combined daily capacity of 800 tons or about 250,000 tons a year. Early in the year there was heavy buying of both Bessemer and open-hearth rods at $32.50 to $33 per ton, but owing to the big demand, prices advanced to $37 in May. No foreign rods were brought into this market, as some of the mills short of steel purchased the foreign ma-

terial in the form of billets and rolled their own rods. The year closed with rods selling at $35.

Structural Steel.

The structural mills of the country have had a phenomenal year. Demand has far exceeded production, and many projects have been delayed from six months to a year on account of the mills being unable to make proper deliveries. One year ago the mills had contracts on their books for upwards of 450,000 tons and as the year progressed this tonnage was increased at a rate never before experienced. In April it became apparent to many structural fitters that if some of the work for which they had contracted would be completed as specified, they would have to get their material abroad, and a large tonnage was purchased from Belgian and German mills for use in the East, and in the Chicago district. None of this material came into this district however. It is estimated that fully 100,000 tons of material went into buildings and bridges and several of the larger contracts have not yet been filled. The erection of bridges for the Wabash railroad, Pennsylvania railroad and the erection of several large plants, notably those of the Westinghouse interests necessitated the placing of immense contracts.

Pool quotations throughtout the entire year remained unchanged at 1.60 c, but throughtout the year, fitters who were able to make prompt deliveries and dealers in all kinds of structural shapes sold their product at premiums ranging from $7 to $15 per ton. The outlook for the ensuing year is very bright, the tonnage of all the local mills being booked almost into the second half. Prices will no doubt remain unchanged, as it was decided to hold them at 1.60c at the recent meeting of the structural manufacturers.

An angle mill to be erected by the Carnegie Steel Co. during the coming year will relieve the scarcity of the smaller sizes and the proposed new beam mill of the Lackawanna Steel Co. at Buffalo, will in time relieve the scarcity in heavy material. The American Bridge Co. is erecting an immense fitting plant at Ambridge, a short distance from Pittsburg. When this is completed all of the local plants will be dismantled. The number of structural fitting plants in this district has been greatly increased during the year and there is some danger that this line will be overdone.

Plates.

At no time in the entire year were the mills caught up on their orders, and contracts now on the books of nearly all the manufacturers run well into April and May. While the agreement price of 1.60c was maintained and quoted on all large orders, the mills easily secured premiums of $5 to $7 on all business for prompt shipment. In May the Eastern manufacturers advanced the price of plates over the ruling quotations $5 per ton, but this was not followed by the Western mills who were content to receive such premiums only on small orders for fairly prompt shipment. The increasing demand for this material on the part of steel car manufacturers is heavily taxing the present capacity of the country, and additional mills could be employed. The Cambria Steel Co. placed a new 134-inch plate mill in operation during the month of October and the Lukens Iron & Steel Co. has a 140-inch mill under erection that will be placed in operation shortly at Coatesville, Pa. These mills will increase the country's plate capacity fully 250,000 tons. Agreement prices for the early months of 1903 will remain the same as they have been during the entire preceding year, and there is every indication that an effort will be made to hold prices on this basis throughout 1903.

Bars.

Prices for iron and steel bars remained uniformly low throughout 1902 in comparison with the cost of forge iron, billets and scrap. Steel bars were selling at 1.50c in January and continued on this basis until April 1 when an advance was made to 1.60c. Before this advance was announced however the large manufacturers of agricultural implements, and other large consumers were given an opportunity to contract for their requirements on the 1.50c basis, and it is estimated that in March contracts for 600,000 tons were placed with Pittsburg mills. In May and June small premiums were paid for certain sizes for prompt shipment, but during the summer months the mills were enabled to catch up on their specifications and the year ended with a slight lull in demand, and a falling off in specifications from the large consumers.

During the months of January and February, iron bars sold at 1.60c Pittsburg, but the price was advanced to 1.70c in March to be followed a few weeks later by another advance to 1.80c. The difference of $4 per ton between iron and steel bars caused some falling off in the demand for the former and in the past three months concessions have been made to the Western trade to 1.70c, Pittsburg. Muck bar steadily advanced throughout the first half of the year from $29.25 to $36 in June. The strike at the mills in Eastern Pennsylvania took a large tonnage of muck out of the market, and local mills secured $35 and $36 per ton for their product until October when the Eastern mills, resuming operations in full, began to offer their product in this market causing prices to fall to $33.

The Republic Iron & Steel Co. has replaced several mills at Youngstown, O., with continuous mills and it is probable that the American Steel Hoop Co. will add several continuous mills to its plants there. The month of December saw the passing of the old Sligo mill on the South Side, Pittsburg. It is to be dismantled but a new company organized at Connellsville, Pa., under the name of the Sligo Iron & Steel Co. will continue to manufacture the brands of iron made at this plant for three quarters of a century.

Wrought Pipe and Tubes.

While competition has been keen, resulting in the unsettling of the market, the output of the pipe and tube mills of the country will be the largest in the history of the trade. The increased capacity of independent mills unsettled the market on merchant pipe about the middle of the year, but despite the fact that the independent mills were making concessions of from 7 to 10 percent, the National Tube Co. retained its discounts. A large tonnage became diverted to the independents but new discounts, considerably lowering prices, were not announced until the middle of November. Much trade found its way back to the National Tube Co. and the year closed with daily record breaking orders for merchant pipe. Two advances amounting to nearly 15 percent were made on boiler tubes and the demand for this product has been unusually large. During the year the LaBelle Iron Works, Wheeling, W. Va., and the Youngstown Iron Sheet & Tube Co. placed pipe mills in operation and the Wheeling Steel & Iron Co., Wheeling, W. Va., also recently added to its capacity. The Sharon Steel Co., whose product will be marketed by the United States Steel Corporation, will place its skelp and pipe mills in operation the latter part of January and at Columbia, Pa., the Susquehanna Iron & Steel Co. has a large plant under erection which will be producing in about three months. The skelp market has fluctuated greatly throughout the entire year. In January iron skelp was held at 1.80c and steel at 1.75c. Prices advanced until in July iron skelp was selling at 2.40c and steel at 2.25c. There has been a slight reaction, however, and prices have fallen about $7 per ton from the high point reached.

Wire and Wire Nails.

The wire and wire nail producing capacity of this district was greatly increased by the addition of the product of the Pittsburg Steel Co.'s new plant at Monessen, Pa., while the product of an additional rod mill at the plant of the Union Steel Co., Donora, Pa., is also being finished. Independent mills have suffered more or less through the entire year on account of the excess producing capacity in these lines, and not only mills of independent interests but those of the American Steel & Wire Co. have been compelled to shut down for brief periods. The high price of rods which prevailed almost the entire year also handicapped many mills. In January the price of wire nails was fixed at $2.05 a keg and this was fairly well maintained until June when there was considerable cutting. A falling off in demand followed, causing a good many shut downs.

Throughout the summer months agreement quotations were not adhered to and on Oct. 1 the American Steel & Wire Co. announced a $2 reduction on nails and wire and a $7 reduction on barb wire. With billets and rods both high, a number of mills were compelled to withdraw from this trade entirely, devoting themselves to specialties. The Sharon and Union Steel companies, the largest producers in the country outside of the American Steel & Wire Co., decided in November, in order to further fortify themselves against the American Steel & Wire Co., to combine. A few weeks later the United States Steel Corporation took over the two properties, thus eliminating the keenest and most formidable competition in the wire and wire nail trade. The Pittsburg Steel Co. is now the largest Central Western competitor of the American Steel & Wire Co., and the plant at Monessen is to be greatly extended the coming year. Cut nail manufacturers have enjoyed a good demand for their product throughout the entire year. Until April the price was $1.95 a keg, but advanced to $2.05 at that time and has been uniformly retained despite the fact that wire nails are now selling at $3 a ton lower.

Sheets.

The great excess of producing capacity in sheets was severely felt during the last half of the year, and with more under construction the outlook for mills that have to enter the open market for their steel supply is not bright. The capacity of the sheet mills operated by independent concerns and those under erection is considerably over 500,000 tons annually, while the capacity of the mills of the American Sheet Steel Co. is about 475,000 tons. When the mills now under erection are completed the sheet capacity of this country will be about 1,000,000 tons annually or twice the consumption during 1901. That many mills will remain idle during a large portion of the coming year is already certain. At present independent interests have under erection 33 mills. When these are completed there will be about 180 independent mills, as compared with 170 of the American Sheet Steel Co.

The largest sheet plant under erection is that of the Sharon Steel Co. at Sharon, Pa. It contains 14 mills, which will be started early in February. The Follansbee Bros. Co. also has a four mill plant under erection near Wellsburg, W. Va., while the Colorado Fuel & Iron Co. is erecting an 8-mill plant. The projected sheet mill of the West Carnegie Sheet Steel Co., at West Carnegie, Pa., was given up because of the overdone condition of the trade.

Early in the year many independent mills that did not control their own steel supply were confronted with extremely high prices for sheet bars. A commissioner was sent to England and Germany to purchase 40,000 tons of steel. His coming being heralded both markets were advanced in anticipation of such a large order. Very little was placed. Later the independent sheet manufacturers formed an association for mutual protection. An attempt was made to have it regulate prices but it disbanded before anything definite was done. Later a number of the mills brought over large tonnage of billets and broke them down to required sizes. The operation was a costly one and the experiment with foreign steel was unsatisfactory.

Owing to the strike in 1901 the American Sheet Steel Co. began the year several months behind on its deliveries and with the new business being placed there was sufficient tonnage to keep nearly all the mills operated by independents in full operation. While the quotation of the American Sheet Steel Co. on No. 28 gauge was 3.10c somewhat higher prices were secured for some time by the outside mills on prompt deliveries. In May, however, the American Sheet Steel Co. practically caught up on its deliveries and went after all available prompt business. The demand for the lighter gauges also fell off considerably during June and July and a number of mills were forced to suspend operations. Prices fell about $2 a ton in June and continued on this basis until September, when a reduction of $5 a ton was announced by the American Sheet Steel Co., which was met. This cut, however, did not greatly stimulate demand and practically all the mills of the American Sheet Steel Co. and the independent companies that were closed during the summer months still remain idle. The demand for heavy sheets was good throughout the year.

No great reductions on galvanized sheets were made, although when black sheets were reduced, lower prices were also made on galvanized. The price of spelter was high almost the entire year and the increased cost of coating the sheets had much to do with steadying prices. The competition on corrugated sheets has likewise increased and there have been several reductions in prices.

Tin Plates.

During the past six months the tin plate trade has been suffering from excess of producing capacity and less than one-half of the mills have been in operation. The increased capacity, coupled with the falling off in demand during the summer months, resulted in the shutting down of fully two-thirds of the mills of the American Tin Plate Co. while less than half of the independent mills continued in operation. While the output of the mills of the country for the past year will probably equal or even slightly exceed that of former years, the increased producing capacity has more than kept pace with the possible increase in the domestic demand. During 1900 and 1901, labor disputes closed the mills for three to four months. There were no labor troubles in the past year, and many of the mills continued to operate through the summer months. These periods, although possibly more extended, are now being made up by the closing of so many mills.

Prices on tin plate remained uniformly at $4 per box of 100-pound coke plates until Nov. 1, when the American Tin Plate Co. made a reduction to $3.60. Even this did not stimulate demand to any great extent, and not until accumulated stocks are disposed of will additional mills be placed in operation. In April the mills began to catch up on their deliveries and stocks began to accumulate in anticipation of an enormous demand from the canneries and packers. Fruits and vegetables for canning and packing purposes did not show the heavy crop expected, however, and the consumption of tin plate through these sources was therefore greatly curtailed.

The independent tin plate manufacturer has played quite an important part in the trade of the year. Throughout the early months, with the American Tin Plate Co. behind on its deliveries, trade was good, and the business was profitable. Tin bars, however, continued to advance and many were forced to secure foreign bars at prices which greatly reduced profits. In several instances the steel could not be used successfully and had to be disposed of at a sacrifice. The reduction on tin plate made on Nov. 1 practically wiped out all profits for the independent producers not having their own steel supply.

Capital is still seeking an outlet in this trade, however. The most recent project is known as the Standard Tin Plate Co., which has already awarded contracts for the erection of a five-mill plant at Canonsburg, Pa. At McKeesport, Pa., the McKeesport Tin Plate Co. will have a ten-mill plant in operation within about 30 days, while at Morgantown, W. Va., the Rolling Mill Co. of America expects to have a ten-mill plant in operation within three months. The Follansbee Bros. Co.'s four-mill plant, near Wellsburg, W. Va., will be in operation about the middle of the year. Outside of these mills and not located directly in this district there are 28 under erection which will produce before the end of the year. Independent tin plate manufacturers now have 96 mills, with 57 under construction. The American Tin Plate Co. has 254 mills. With the outside mills now under construction and contemplated there will be 407 mills in this country before the end of the year, with a possible producing capacity of fully 800,000 tons. The heaviest domestic consumption amounted to about 400,000 tons in 1901.

In order to secure the rebate tin plate trade which is now going to Welsh mills, the tin plate workers of the American Tin Plate Co. considered a reduction of 25 percent in wages on all such plate rolled. At a special convention, another plan was adopted which provides for a straight reduction of 3 percent. While the tin plate workers were discussing this question an order for 200,000 boxes of plate was placed abroad, and since that time the price of Welsh plate has been materially reduced, thus making it practi-

cally impossible for the American Tin Plate Co. to accept any of this business, despite the reduction made in the cost of rolling. This rebate trade is estimated at 1,500,000 boxes a year, but has not quite reached this estimate in any one year. If all this trade can be captured it will keep about 40 mills operating in full throughout the year and will greatly lessen competition for domestic business.

The Embargo on Coke.

The shortage in the supply of coke greatly interfered with the proper operation of foundries and blast furnaces almost throughout the year. Not that the year's output of the Connellsville region and other great coke producing districts was smaller than in former years, but there was an increased demand from all sources, with which these coke producing regions did not keep pace; and besides, the railroads could not transport what coke was made. The anthracite strike causing furnaces using anthracite to change to coke, withdrew an immense tonnage from regular consumers, and strikes in other regions greatly interfered with coke production. Despite these troubles it is estimated that the coke production of the country will exceed that of former years, while figures at hand indicate that the production of the upper and lower Connellsville region will amount to approximately 14,500,000 tons, as compared with 12,609,949 tons in 1901.

The withdrawal of the H. C. Frick Coke Co. from the general market was a noteworthy event. As the supply of Connellsville coke from other producers is very limited, the coke of other regions will come into more general use. The withdrawal of this large producer from the market is in line with the policy of the United States Steel Corporation to husband its mineral resources for its constituent companies. Furnace coke will however be furnished the merchant furnaces in the Mahoning and Shenango Valleys that supply the corporation companies with iron. The Frick Coke Co. and other coke interests of the United States Steel Corporation own and operate 17,115 ovens located in the Connellsville region and elsewhere in Western Pennsylvania. In addition 2,000 ovens are under construction in the Connellsville region and in West Virginia and 2,000 additional ovens are projected. Heretofore the Frick Coke Co. also sold the entire output of about 1,600 ovens in the Connellsville region, but these contracts were not renewed, expiring on Dec. 31. Large independent furnace interests immediately contracted for the entire output of these ovens for 1903.

How long the present scarcity of coke will continue is a question that is being gravely considered. Many large furnace interests have already purchased extensive tracts of coal lands in both Pennsylvania and West Virginia for the purpose of erecting their own coking plants and from data at hand it appears that during the present year sufficient new capacity will be in operation to supply all demands. There are under construction at the present time about 15,000 bee-hive ovens in this country, fully one-half of which will be producing by July 1. In addition about 1,500 retort coke ovens are to be built during the coming year. The estimated increase in the production, available on January 1, 1904, is conservatively estimated at 12,000,000 tons, which more than keeps pace with the increased blast furnace and foundry capacity.

New high price records for both furnace and foundry coke were established during the year. Sales of coke were made during the months of October and November at $14 at the ovens and a very large tonnage for prompt shipment was sold at $9 and $10 per ton. Contract prices on furnace coke running through the year were established by the H. C. Frick Coke Co. at $2.25 per ton while foundry coke was contracted for on a basis of $2.75 at the ovens. Prompt coke advanced in March and April 50 cents a ton and at the middle of the year coke producers easily secured $4 and $5 per ton for prompt furnace coke. Prices continued to advance until the point was reached where consumers willingly paid what was asked. Independent operators early in October decided to ask $4 for furnace coke for shipment throughout 1903 and $4.50 for foundry coke. During the latter part of this month the H. C. Frick Coke Co. announced its policy and established an inter-company price of $3 for furnace coke. This had no bearing whatever on the general market and independent producers closed contracts for 1903 at practically their own prices. Contracts for furnace coke were made at from $3.50 to $4.50 and for foundry at $4.50 to $5.25. During December prices for prompt coke began to ease off and any considerable tonnage of furnace coke could be had at $5 to $6 while foundry coke sold at $5.50 to $7.

AVERAGE MONTHLY PRICES OF IRON AND STEEL PRODUCTS AT PITTSBURG, 1902.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Bessemer Pig Iron	$16 75	$17.25	$18.00	$19.75	$20 50	$21.00	$21 25	$21.50	$22.00	$22 25	$22,50	$22.75
Gray Forge Iron	15 50	16.50	17.25	19.00	20.25	20.75	20.75	20 75	21.00	21.00	21 00	21.00
No. 2 Foundry Iron, Northern	16.25	17.25	17.50	20.00	21.00	22.00	22.25	22.50	22 75	23.00	23.00	23.00
Bessemer Billets, 4 x 4"	27.50	28.00	32.00	32.00	33.00	35.00	33 50	32.00	31.00	29 00	29 50	30.00
Steel Bars	1 50c	1.50c	1 50c	1.60c	1 60c	1 60c	1.60c	1.60c	1 60c	1 60c	1 60c	1 60c
Muck Bar	29 25	29.25	32.50	33.00	34.50	36 00	36.00	35 00	36.00	35.00	33.50	33.00
Tank Plate	1.60c	1 60c	1.60c	1 60c	1.60c	1.60c	1.60c	1 60c	1.60c	1.60c	1.60c	1.60c
Sheets No. 28	3c	3.10c	3.10c	3.10c	3.10c	3 00c	3.00c	3 00c	2.75c	2.75c	2.75c	2.75c
Ferro-Manganese	52.50	52.50	52.50	52.50	52,50	52 50	*	*	*	*	*	*
Furnace Coke at Ovens	2.25	2.25	2.50	2.50	2,50	2.50	2.50	3.25	4.00	5.00	5.00	5.00
Foundry Coke at Ovens	2.75	2.75	3.00	3.00	3 00	3.00	3.00	3.50	4.50	6.00	6.00	6.00
Wire Nails	2.05	2.05	2.05	2.05	2.05	2.05	2.00	2.00	2.00	1.90	1.90	1.90
Cut Nails	2.05	1.95	2.00	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05
Beams and Channels, 3 to 15 inches	1.60c	1.60c	1.60c	1.60c	1.60	1.60c	1 60c	1.60c	1.60c	1.60c	1.60c	1.60c
Iron Skelp	1.80c	1.80c	1.95c	2.05c	2.15c	2.35c	2.30c	2 10c	2.05c	2c	1.95c	1.90c
Steel Skelp	1.75c	1.70c	1.85c	1.95c	2.05c	2.25c	2.25c	2.25c	2.15c	2.10c	2c	1.95c
Rails	28.00	28 00	28.00	28.00	28.00	28.00	28 00	28 00	28 00	28.00	28 00	28.00
Iron Bars	1.50c	1 60c	1.70c	1.70c	1.70c	1 80c	1 80c	1.80c	1.80c	1.80c	1.70c	1.70c
Tin Plate	4.00	4.00	4 00	4.00	4 00	4 00	4.00	4.00	4.00	4.00	3.60	3.6c

NOTE.—Agreement quotations are given as the average prices for plates and structural material for the year inasmuch as a relatively small tonnage was sold at higher prices, the bulk of the year's business being on contracts closed at the agreement prices.
* In July, domestic ferro-manganese was withdrawn from the market.

Labor Questions of the Year.

The acceptance of what is practically a continuous scale by the Amalgamated Association of Iron, Steel and Tin Workers of America prevented the annual closing of the mills during July. Last March the sheet and tin plate scales were renewed with the American Sheet Steel Co. and the American Tin Plate Co., until June 30, 1903, subject to confirmation at the annual convention of the Amalgamated Association. The Republic Iron & Steel Co. and the American Steel Hoop Co. also signed scales for another year on a similar basis. The base rates on the three scales were the same as those in force at the time the provisional agreements were drawn up. In convention the action of the officials of the Amalgamated Association was ratified and outside of a few minor changes in the foot notes the new scale was practically the same as that adopted the year before.

The foot-notes on the tin plate scale were not signed until after the adjournment of the special convention of the association called for the purpose of considering a 25 percent reduction in wages on all export tin plate rolled in the mills of the American Tin Plate Co. When the de-

mand for tin plate began to fall off early in the summer months, officials of the association believed that if they would work in harmony with the American Tin Plate Co. on this matter it would be possible for all tin plate now imported for re-export under the drawback, to be rolled in the mills of this country. Officials of the American Tin Plate Co. asserted that if a 25 percent reduction in wages would be accepted on all rebate tin plate, orders aggregating 1,500,000 boxes could be secured during the year. The proposition was placed before the tin plate workers a number of times, but in each instance the vote went against the proposition. As a last resort a special convention of tin workers was called and after deliberating for nearly two weeks it was decided to accept a uniform reduction in wages amounting to 3 percent on all tin plate rolled. This reduction in wages was to establish a fund to be drawn upon from time to time to pay for the 25 percent allowance on the cost of rolling all plate that would replace the present rebate plate. This fund, however, has its restrictions and will not permit the American Tin Plate Co. to accept orders for more than one box of tin plate for this trade out of every 8 1-3 boxes rolled in the company's mills over which the Amalgamated Association has jurisdiction. In order to capture the entire trade thus offered it will become necessary for the company to arrange for a reduction in wages with its employes in its non-union mills and it is probable that this will be done. This fund has now been accumulating for about two months, but has not yet been drawn upon as the expected trade for foreign shipment has not been captured.

The demands of the blast furnace workers in the Mahoning and Shenango Valleys for an 8-hour day resulted in the banking of about half of the furnaces in the two valleys for nearly ten days, although the matter was adjusted in less than a week by making a uniform advance of 10 percent, the men continuing to work on 12-hour shifts. At the annual convention of the blast furnace workers held several months ago it was decided again to demand the 8-hour day on May 1 and it is probable that trouble may again occur as the furnace operators are almost a unit against granting this demand for the reason that sufficient employes cannot be secured to man the furnaces.

One of the most protracted labor disputes with which the Amalgamated Association was concerned during the year occurred at the plants of the American Iron & Steel Mfg. Co. in the Eastern part of this State. On July 1 an advance in puddling rates was demanded to $4.50 per ton and for several weeks nearly every plant in that section of the State was closed. The majority yielded, however, and operations were resumed at all plants except those of the American Iron & Steel Mfg. Co. Efforts to place the plant in operation from time to time proved unsuccessful and after a four months' siege the men returned to work.

During the strike in the anthracite region the bituminous miners throughout this district remained at work. In the West Virginia field strikes of the coal miners resulted in closing the coke works from two to four months, greatly curtailing the production of coke and interfering with the shipments of coal from this region.

On July 1 the machinists employed in nearly all of the machine shops in this district were given a uniform advance of 5 percent and only two shops were shut down for brief periods by the machinists where this advance was at first refused. The demands of the core makers for an advance in wages and shorter hours were refused and the strike was declared off after being waged fiercely for fully three months. The molders secured an advance in wages, a compromise being effected with them by the founders affiliated with the National Founders' Association.

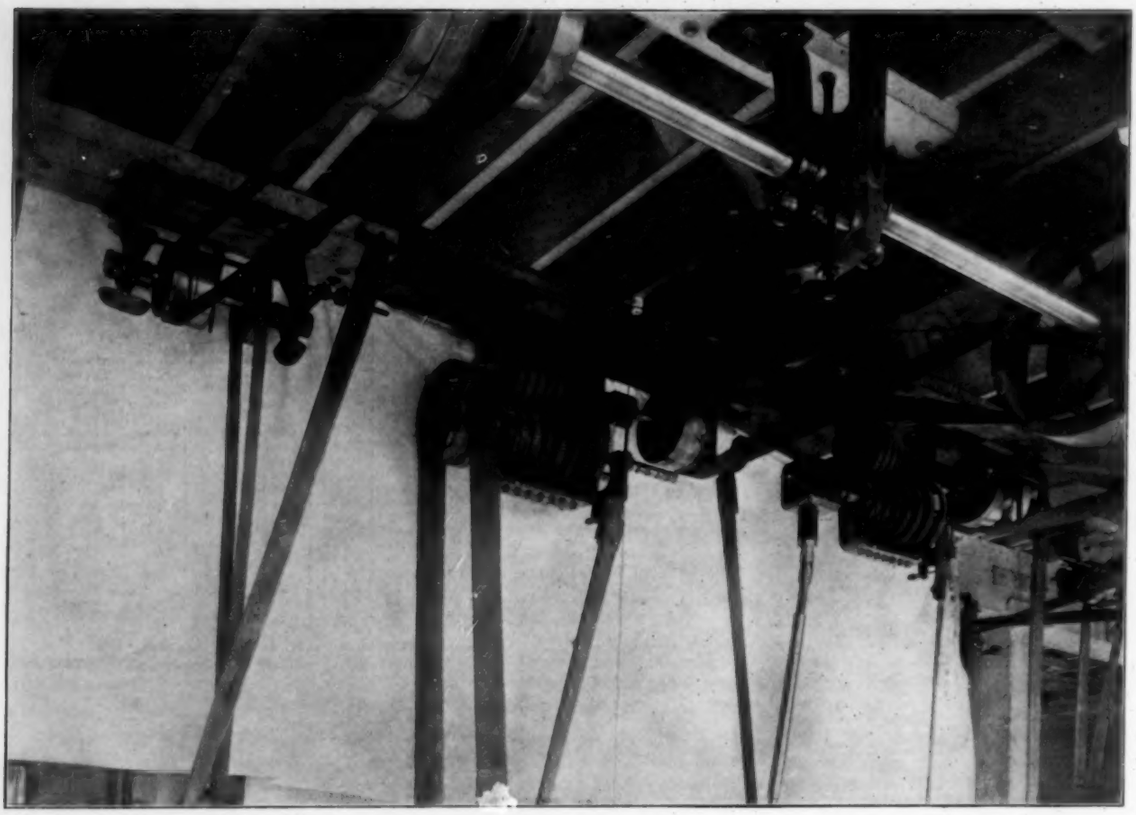


FIG. 1.—OVERHEAD WORKS OF LODGE & SHIPLEY MACHINE TOOL CO.'S HEAVY SCREW MACHINE.

The American Car & Foundry Co. has received new orders for cars as follows: Wabash, 47 coaches; Chicago & Eastern Illinois, 32 coaches; Queen & Crescent, 10 coaches; other orders, 123.

The Lackawanna Steel Co., Buffalo, received its first iron ore by water December 23. The steamer Moses Taylor brought 6,200 tons of ore into the new ship canal and anchored at the unloading dock. It is expected that the manufacture of steel will begin within a few weeks.

EXTRA HEAVY SCREW MACHINES.

A 24-inch extra heavy screw machine made by the Lodge & Shipley Machine Tool Co. and in use in the plant of that firm in Cincinnati, is illustrated in Figs. 1 and 2. The machine is intended for a very heavy class of screw machine work and weighs about 6,000 pounds with an 8-foot bed. The automatic rotating turret is provided with a tool steel index of large diameter and a tool steel locking pin which is adjustable by a taper gib. The wire feed is of the well known Parkhurst design and will take work up to 3⅛ inches in diameter. The overhead works seen in Fig. 1 have the speed variators introduced to take the place to a large extent of the cone pulley system of belt changes.

As a speed changing and power transmitting device the cone pulley is full of faults. To give anything like an adequate number and range of speeds means a length of cone out of all proportion to the rest of the machine. This has resulted in the general use of cones having the smallest excusable number of steps with consequent big jumps between the different speeds and the narrowest excusable widths of belts. Shifting the belt from one step to another means a journey from the work to the belt and back again and is both troublesome and dangerous—so troublesome, in fact, that nine times out of ten the journey is not made and the belt is not shifted and the output of the machine is left to take care of itself. The life of the belt is greatly shortened by frequent changes on a cone pulley and furthermore when the machine is speeded slowest and should carry the heaviest cut, and when therefore it is in need of the most power, the belt is on the smallest step of the driving cone and is therefore transmitting the least amount of power.

With the old-time, slow-cutting speeds, the cone pulley was bad enough; but today with the maximum cutting speeds more than doubled, and the proportionately greater range to be covered a more efficient substitute has become an absolute necessity. For these reasons the inventive skill of the machine tool designer is producing substitutes for cones on the main spindle as well as improved and positive feed gearing.

The present instance is a worthy addition to the examples of modern turret machinery and illustrates the time saving desires of the up to date shop manager. The turret was specially built for the use shown and the machine is now being employed for machining steel parts from the solid bar which require deep drilling. Such parts for example as these illustrated on the floor in front of the machine, long gear blanks and sleeves. These pieces are drilled while the forming rest is in operation. The speed of the lathe is materially reduced during these heavy forming cuts and a drill cutting at this rate would be far from satisfactory. The drill, however, in this case is given a rotation in the opposite direction to the work by means of the gearing shown. A jointed rod with universal connections actuating the gears at the turret from a similar train at the overhead works and the speed variator. The latter giving a wide range of cutting speeds for drilling during the forming operations and the two, drilling and forming, do not become, therefore, so disproportionate in results as the work usually appears.

There is a saving also in the change of speeds required at the headstock under the common practice and one is fully prepared to credit the assertion of those in charge that the time required on this work has been cut down one half.

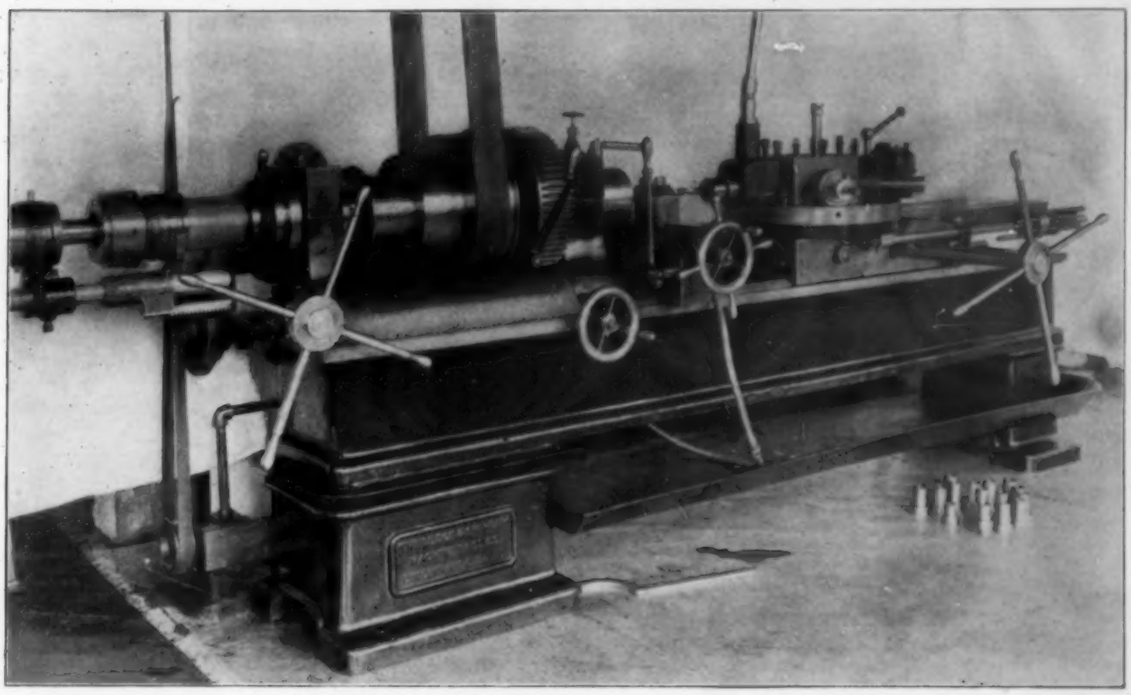


FIG. 2.—24-INCH EXTRA HEAVY SCREW MACHINE, WITH POWER DRIVE TO TURRET DRILL.

The Canadian steel manufacturers will make strong representations before parliament at its next session asking for a duty on the heavier grades of rails. An impression prevails that the request will be granted, for the reason that it has always been understood that as soon as a rail plant was in operation with a reasonable capacity, it would receive the same protection now accorded to other steel products.

The stockholders of the Cambria Steel Co. at a special meeting amended the by-laws in order to elect three of the nine directors each year, and thus have a majority of hold-over directors continually. The annual meeting will be held, after this year, on the third Tuesday in March.

At Chicago, Dec. 27, George Hinchliff was awarded $22,000 damages against the members of the Chicago Masons and Builders' Association and the Brick Manufacturers' Association. Hinchliff asked for $100,000 damages, because of a boycott of the product of his brickyards at Hobert, Ind. in 1898.

A. M. Crane & Co., Inc., The Rookery, Chicago, ask that manufacturers of machinery, tools and specialties send them their catalogues and discount sheets. The Crane firm has recently organized a mail order department and will publish a monthly stock and mill list. It is their purpose to arrange with leading manufacturers of specialties and tools to handle their products through this mail order department.

NEW RAILROADS, CARS AND LOCOMOTIVES IN 1902

The *Railroad Gazette's* preliminary estimate, based on an individual canvass of the railroads and figures of the State railroad commissions, shows approximately 6,026 miles of new steam railroad built in the United States in 1902. The figures are exclusive of second track, sidings and all electric lines. Rebuilt mileage is also excluded except where the work involved such extensive changes in alignment that a new route was established, as in the case of the Southern Pacific between certain points in Nevada. Railroad building was reported done in 42 States and territories, and Oklahoma leads the list with track laid on 570 miles of new line during the year. Texas comes second with 496 miles, Arkansas is third with 371 miles and Indian Territory is fourth with 363 miles. Georgia built 336 miles during the year. In addition to these, Illinois, Iowa, Missouri, and New Mexico show returns of over 200 miles built; and Alabama, California, Florida, Louisiana, Michigan, Minnesota, Mississippi, Ohio, Pennsylvania, Washington and West Virginia built between 100 and 200 miles. No new steam mileage was reported from Alaska, Delaware, Idaho, Maryland, New Hampshire, New Jersey, Rhode Island or Wyoming. The tables following show that the current figures are considerably larger than those for any year during the past decade. This new mileage has not been exceeded since 1888:

1893	3,024	1898	3,265
1894	1,760	1899	4,569
1895	1,428	1900	4,894
1896	1,692	1901	5,368
1897	2,109	1902	6,026

The same paper has returns from nearly every locomtive and car building plant in the country. These show approximately 164,547 cars built in 1902, including cars for use on elevated railroads, but exclusive of street and other electric cars. This is considerably the largest record which has ever been made in the country and exceeds by 25,542 the output for 1901. These figures, of course, do not include cars built by railroads at their own shops. Of the cars recorded, approximately 162,599 are for freight service, and 1,948 for passenger service, 161,747 are for domestic use, and 2,800 are for export. Last year the total number of cars built was 144,267, which exceeded by 20,161 the recorded output for the year 1900. The 1901 figures included also 5,262 street cars.

During the year 4,070 locomotives were built at the various locomotive plants in the country, as against 3,384 last year The number for the current year includes 74 electric locomotives. The total represents about $48,000,000, if the average cost per locomotive is assumed to be $12,000. The Baldwin Locomotive Works turned out 1,520 in 1902, against 1,375 in 1901 and 1,217 in 1900.

The bridge and structural iron workers' union, of Milwaukee, will demand an hourly wage of 45 cents, effective May 1.

The Standard Steel Car Co. has received an order for 2,000 box cars from the New York, New Haven & Hartford Railroad.

The Atlantic Iron & Steel Co., New Castle, Pa., whose plant has been closed since early November on account of inability to get a supply of coke, will soon resume, giving employment to about 600 men.

The Ames Tool & Shovel Co., Indianapolis, Ind., has decided that it will not be advisable to try to use gas any longer on account of the inadequate supply, and new engines will be put in at an early date. Large boilers are now being installed with oil burners. The engines are of 600 h. p.

How busy the foundries of Greater New York are is shown by the delay in the erection of house corner signs. About 3,500 metal house corner signs have been put up, but much remains to be done. The frequent delays are blamed upon the foundries undertaking to do the work.

MR. FRICK AND THE STEEL CORPORATION.

Concerning the rumors that he is to become president of the United States Steel Corporation, H. C. Frick has made the following statement to the Associated Press:

"There is no vacancy in the presidency of the United States Steel Corporation or any other executive position, that I know of, and even if there were, and I should be offered one, my own affairs require so much of my time that it would not be possible for me to consider anything of the kind. I am much averse to newspaper interviews, but my name has been so persistently used in connection with positions in the United States Steel Corporation that I rather welcome the opportunity of making this statement. I have retired from active business and nothing would induce me to take any position that could claim my time from my own affairs. I am a director in the United States Steel Corporation besides being a large stockholder, and am very much interested in its success, and while I am willing to give all the time and attention required of me as a director, I could not accept any position that required my daily and exclusive attention.

"The various constituent companies are well organized and have very capable men in charge of them. I had an opportunity, during the recent inspection, of meeting a number of the presidents and others, of the constituent companies, management, and was delighted at the enthusiasm and interest shown in their various organizations, and after all it is of greater importance to have those various constituent companies well managed than who may be president or chairman of the executive committee of the United States Steel Corporation. The executive and finance committees of the United States Steel Corporation are composed of very able men and they are giving the business of the corporation careful attention.

"Mr. Morgan has accomplished a great many big things in his time, but he never put anything together, in my opinion, that has the merit, nor that did more for the capitalist, laborer and the consumer than when he formed the United States Steel Corporation. Its position, so far as ore and fuel is concerned, is impregnable, and, without ore and coal—it does not matter how much money it may have—no concern can become an important factor in the steel business."

There is a bitter strife between the Bridge and Structural Iron Workers' International Union and the United Metal Workers' International Union, and the former now declare they will demand of the American Bridge Co. that all its employes must hereafter join their union. National President Frank Buchanan, of the Bridge and Structural Iron Workers' International Union has been quoted as saying: "Not a member of our union will handle a piece of material that is made by a member of any other organization. We were willing to work in harmony with the United Metal Workers' International Union, but when they declared war by permitting the material makers to take the place of construction workers, we had to meet them with a new policy. This means that the United States Steel Corporation must recognize our union or go out of the bridge building business. It must refuse to employ any member of the United Metal Workers' International Union."

The earnings of the Brooks Locomotive Works, of Dunkirk, N. Y., for the past six months were $15,265,387. Fifty-one complete locomotives were turned out in December, and the schedule for January calls for fifty-four.

The Pennsylvania Railroad, finding that the foundries of the company's shops at Columbus, O., are not able to turn out castings rapidly enough, has decided to give out a large amount of work to foundries at Steubenville, O., and Logansport, Ind.

The Marinette Iron Works Co., Marinette, Wis., is installing a gas engine of 75 h. p., replacing a steam engine.

SUGGESTED AT THE SHOP.

BY F. O. REMAN.

A page from an esteemed contemporary, as the phrase goes, has come my way. The plant of a leading engineering concern is under discussion and things are detailed at some length. These comprise methods and machines, but not much of either has the charm of novelty. The drafting room comes in for attention and right here is a feature which deserves consideration. Some people have ventured to criticise the draftsman upon the paradoxical position he occupies as a designer and engineer who seldom if ever moves toward the improvement of his working tools. But here and there are indications of an awakening, and improvements are to be expected, as will be understood from the following extract from the aforesaid article:

* * * * *

"Taking first the drawing office, it was found that this was replete with every modern convenience, including vertical drawing boards, card system of indexing drawings, and electric printing apparatus. To those not acquainted with the vertical drawing boards, these seem at first sight very peculiar, but those who have worked on same could not be persuaded to go back to the old system of horizontal boards. The boards are not strictly vertical, being set at an angle of about 15 degrees from the vertical. They are balanced so that the draughtsman may always have the portion of the paper he is working on at a convenient position, either when sitting or standing. The T-squares are replaced by balanced parallel rules, and convenient trays for instruments are made both at the bottom of the rules and the bottom of the boards. The erect position for working is far healthier than the usual style of lying cramped on a large board trying to work on a fine scale drawing at the top of the paper, and the constant raising and lowering of the board forms a manual exercise that the draftsman is ordinarily deprived of, but stands much in need."

* * * * *

The closing part of the last sentence attracts my eye and starts an inquiry. Are the shop betterment schemes of the day beneficial or buncombe? Should we not get at the improvement of shops and offices on different and possibly more rational lines? If it is a good thing to increase the manual labor of the draftsman, would it not be worth while to get around the shop and hunt for other and equally salutary ways and means of promoting effort for the remainder of the employes? A great deal can be done in this direction if one is really in touch with the spirit of increasing physical exercise in the factory.

* * * * *

The quicker a man can get over the floor is so much in his favor of course. His rate of progression could be quickened by putting the belt shifters a trifle beyond his average reach. This is not so uncommon as it may be imagined. I saw a machine at work in a plant visited about a week ago and the belt shifter handle was several feet away from the position where the workman could best follow the progress of the work. No doubt the designer intended to speed up the operator and whirl him back and forth, from the lever to front of the machine. Maybe the long reach would develop humanity specially to fit that environment but the fellow who handled the particular machine I have in mind had no regard for the hopes of designers of this ilk. Not he. He could not reach the handle with the best effort in his power but he could and did manage to kick the belt fork and this worked admirably in bringing things to a dead stop. But even this ingenuity failed, as it doubtless deserved, when tackling the problem of starting the machine at short range.

* * * * *

Increasing difficulty will stimulate a man to invention. He will do his level best to cross 20-foot streams with 10-foot bridges and many a shaft has been finished (after a while) in a lathe which had first seemed either too short or too something else. But there's a limit to this sort of thing in the minds of men who do not seem capable of imbibing the spirit which approves so much of development by exercise. Can there be any doubt that a dim religious light (as I have somewhere heard it called) would not cause a greater effort on the part of the man who was trying to see the fine graduations on the hand wheel of a cross-feed screw? That dim religious light has been known to make men sick, mad and then profane under these conditions; but perhaps it was just the training they needed—something to key them up to concert pitch and bring out the best at hand.

* * * * *

The clipping I have borrowed is taken from an English journal, the *Mechanical Engineer*. The item suggests anew the propriety of taking an account of stock, a little inventory of shop practice and procedure at the beginning of a new year. The point for debate seems to come in the dilemma of adapting business to men or men to business. Many men, possibly misguided but unquestionably sincere, have held that shops should not be run for the sole purpose of finding jobs for men. That was one of the inevitable consequences of the affair that was not held to rank as a cause. Running a business for manual exercise would have seemed to these men absolutely absurd. On the contrary, instead of cultivating a system of machine shop athletics they have encouraged a system (or perhaps a lack of system) which runs to the other extreme and is apt to weaken the muscles from sheer inaction. Gone are the days when keyways were driven, dies were sunk and weights lifted by manual exercise and an occasional expletive for good measure. "Expletive" will serve to describe the thing if pronounced with explosive persistence.

* * * * *

Things are different. I was in a shop the other day and not a badly laced belt in sight. I have had some belt experience that would be worthless in a shop of that type. The floor was clean. I know one shop at least where hunting for a needle in a haystack seemed the fortune of the fellow who dropped things on the floor. But then this would be like the manual exercise training—it would teach him to keep things off the floor or forget the fallen anyway. The main difference nowadays is really in the greater comfort of manufacturing, the greater ease with which results may be obtained with less expenditure of muscular effort; and as we have seen it, all depends upon the point of view whether this is considered a blessing or a curse. Men have changed but little if any under the altered circumstances. True, it is not considered so much a matter for congratulation because you are rigging up some old, worn-out, machine to do work that other tools, once special but now standard, perform with an ease and certainty of stroke that your patched up mongrel can never equal. In the old shop the memory was regularly on the rack adapting business and tools to fit and men were nowhere in comparison. Later the human element came to the front; was considered as a part of a machine—a collection of levers (a crank or two, maybe), and all the better for the lubrication of good working conditions. Nothing in this, mind you, of more manual exercise or even as much as of old; merely more light, better ventilation, washroom, plenty of good tools and neat readable drawings.

* * * * *

Why, I was in a shop once where they were considering lighting possibilities; already had electric lights but actually thought there might be some system of diffused light to be had which would do away with any shadows. I remember many murky and miserable moments with a tallow candle stuck in a half-inch nut. The awkward, evil smelling and inefficient petticoat lamp was little better. But what effect have these changes had on the men? The struggle to do good work with poor equipment was the natural outcome of that discontent which is the craftsman's portion. The longer reach is the present day legacy of the work of these earlier pioneers, but the gift does not bring contentment by any means. In fact, on the ground that, as we are assured, the ass is a patient animal, it is equally true that the patient are in the same class. The impatience that was fettered with miserably monotonous working conditions has now to spend its energy in more productive effort. Does it need a revival of what some people call the good old days to bring out its best? Will it be any the better for a little more manual exercise? Shall the shop be run for business or something else? Is this point the secret of the distinction between American and European practice in handling shops?

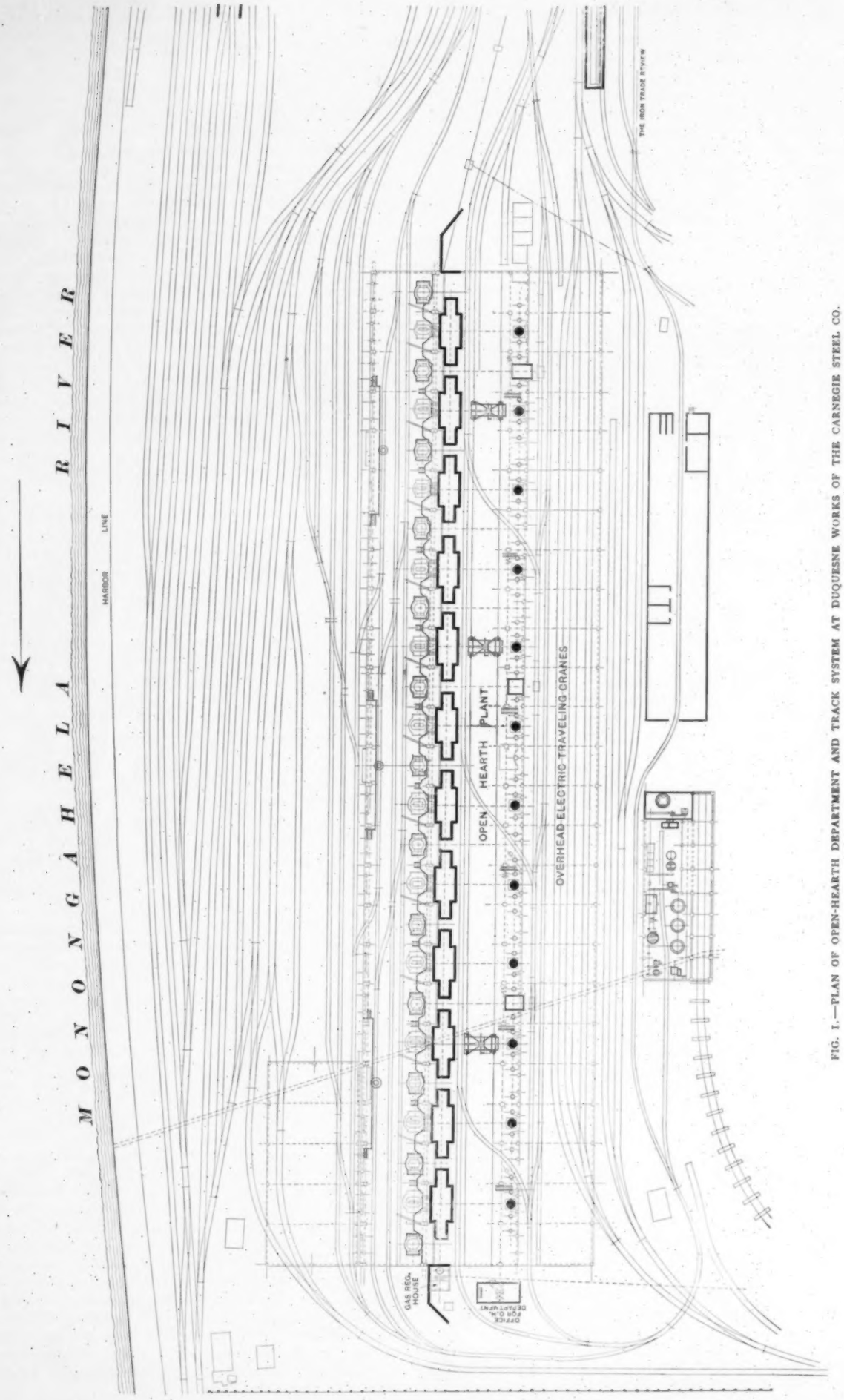


FIG. 1.—PLAN OF OPEN-HEARTH DEPARTMENT AND TRACK SYSTEM AT DUQUESNE WORKS OF THE CARNEGIE STEEL CO.

The Open-Hearth Plant and 40-Inch Blooming Mill of the Carnegie Steel Co., at Duquesne, Pa.

To enable it to supply the constantly growing demand for basic open-hearth steel in the form of slabs, blooms and billets of all sizes, the Carnegie Steel Co. decided in the fall of 1899 to erect an open-hearth plant and blooming mill at Duquesne. The open-hearth steel was also to be used for the production of rounds and flats in the new merchant bar mills as well as for other products for several contemplated finishing mills.

Open-Hearth Plant.

The kind of furnace selected was the stationary type of 50-ton capacity as being most suitable for the requirements and very economical in operation. Twelve of these furnaces were erected in one line and two more have been added, making 14 in all in one building, 128 feet 3 inches wide and 957 feet long. The stock yard, 62 feet 1 inch wide and 924 feet long, adjoining the furnace building contains two standard gauge and three narrow gauge tracks, and is spanned by four 5-ton electric traveling cranes. The latter handle the raw material placed in charging boxes, depositing the filled boxes on cars which are weighed on track scales and delivered by locomotive to the track in front of the furnaces. Three Wellman-Seaver charging machines traveling on tracks the full length of the building then deposit the charges on the furnace bottoms.

The charging floor, being the floor of the furnace building 75 feet wide and 990 feet long, is provided at one end with two track inlets for hot metal cars from the blast furnaces and spanned with a 40-ton overhead electric traveling crane for handling the hot metal ladles from these cars to any one of the 14 furnaces requiring such charge. The main hoist of this crane is provided with hooks to fit the trunnions on ladles. Hoisting is done from a 2-drum trolley, with its hoisting chains outside of girders. The 15-ton auxiliary hoist is placed in a separate trolley between the girders and is used for tipping the ladles when charging the furnaces with molten iron as well as for facilitating the usual repairs around the furnaces.

The pouring building floor, 53 feet 3 inches wide and 957 feet long, is 9 feet lower than the charging floor and contains the ladle pits and repair pits. Three narrow gauge tracks extend the full length of building with suitable cross-overs, four pouring platforms with their car pushers and three 75-ton overhead electric traveling cranes as well as small hydraulic cranes, one for each furnace, for handling spouts, bridges, etc. The ladle pits are very shallow being only 3 feet 9 inches deep, thereby greatly facilitating the work of removing the hot cinders and cleaning the pits. The cinder is loaded on cars on track nearest to furnaces; the middle track is the running track and the outside track is the pouring track along which the four pouring platforms are located. Underneath each platform is located the car pusher for moving the cars to the proper location for pouring, the pusher being hydraulic and operated from the platform.

Overhead three 75-ton electric traveling cranes are provided for hoisting and transporting the filled steel ladles from the furnaces to any one of the pouring locations, and for placing the ladles in the stands over the repair pits and subsequently on stools over ladle pits in front of the furnaces. The two drums of the 75-ton main hoist trolley are spread enough to allow the hoisting chains as well as the guides to pass down on the outside of the bridge girders so as to allow the 25-ton auxiliary hoist carriage to be placed between girders and travel full length of same, enabling this hoist to tip the ladle in either direction.

A skull cracker structure is provided outside the pouring building with overhead electric traveling crane with a 25-ton main and 5-ton auxiliary hoist giving a drop height of about 50 feet; also a mold yard provided with a 5-ton overhead traveling electric crane for handling and placing molds, stools, etc., on cars.

The Open-Hearth Furnaces.

Each furnace measures 13 feet 11 inches in width and 27 feet in length inside and is built on a substantial concrete and brick foundation with imbedded structural steel ties for securing the lower ends of the uprights constituting the steel frame work of the furnace. On the foundation is built a layer, 2 feet 1 inch in depth, of first quality fire brick, on top of which is placed 4½ inches of chrome bricks and the hearth finished first with a 4½-inch layer of magnesite brick and then with loose magnesite mixed with slag which is fused or sintered in place, the material being deposited gradually by shovelfuls until the hearth is ready. The bottoms of the uptakes are provided with slag pockets which can easily be cleaned, easy access to same being had from the lower floor.

The regenerating chambers are located below the structural charging floor and away from the furnace. The size of the air chambers is 10x22x11 feet 11 inches and of the gas chambers 6x22x11 feet 3½ inches. Both chambers are being used for air as natural gas is the fuel. The reversing valves are also located below the charging floor, the flues entering the base of the stack. The stack is 5 feet 2 inches inside diameter of lining and 144 feet 3½ inches high.

The front of the furnace proper is provided with three charging doors and two inspection or repair doors and the back with two large doors and two small ones. Convenient access to these doors and the tapping holes is provided for by the large extensions to the charging floor around the back of the furnaces. All the large doors and door frames are water cooled. All doors are lifted by small hydraulic cylinders from nest of Critchlow valves, each nest being large enough for two furnaces. This plant is arranged so that producer gas can be adopted at very short notice in case the supply of natural gas would not be sufficient. The production of twelve of these furnaces has been somewhat above 40,000 tons of steel per month.

The size of ingots usually produced are 18½ inchesx21½ inchesx5 feet 10¾ inches, weighing about 6,000 pounds and 22 inchesx25 inchesx5 feet 5 inches, weighing about 8,000 pounds. The ingots having been cast on cars in the open-hearth department are transferred to the stripper located in a separate building, where the molds are removed, placed on empty cars and returned to the mold yard outside of the pouring building for cooling, the ingots being transferred to the soaking pits for heating.

The stripper is a hydraulic duplex machine, stripping two ingots at the same time and provided with cross travel so as to deposit the molds on empty cars on a side track. A hydraulic pusher is located between the two tracks for spotting the loaded and empty cars to suit the stripper. The stripping is done by two plungers 19 inches in diameter which, at 500 pounds pressure per square inch, exert a total stripping force on each mold of about 141,000 pounds. After the mold is loose from the ingot it is handled by a smaller cylinder so as to use less amount of water. In this building is located a 6½-ton hydraulic crane for handling stickers and molds that accidentally may fall during the manipulations in this building. On the road from the stripper to the soaking pits the ingots are weighed on a track scale.

Blooming Mill and Soaking Pits.

The location of the 40-inch blooming mill in reference to the other plants was selected so as to enable the mill to draw its supply of heated ingots from any one of the pit furnaces, derive its steam supply from a centrally located boiler house and at the same time have its own outlet for the finished product so as not to interfere with the shipping department of the other mills.

To accomplish this nine new pit furnaces were built, each one in a right angular direction from the former ones. Of this number five were contemplated to be used for the old mill and four for the new blooming mill. Track inlets were provided between every two furnaces for the incoming ingots, so that the charging crane can place the steel in the pits without handling the ingots above any other pit, or over any cover or machinery for operating same. A structural floor supported independently covers all the regenerative chambers, which

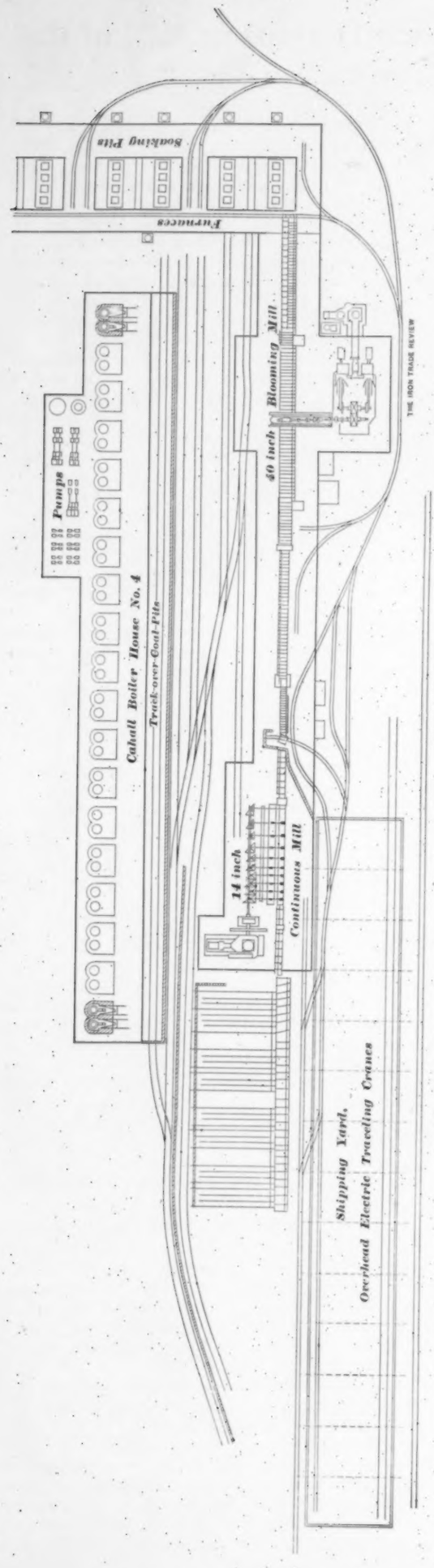


FIG. 2.—40-INCH BLOOMING AND 14-INCH BILLET MILLS AT THE DUQUESNE WORKS OF THE CARNEGIE STEEL CO.

floor supports the covers and hydraulic operating mechanism for same. Wherever there is any likelihood that ingots may drop this floor is strengthened with a layer of rails placed side by side.

Outside the ends of the pit furnaces is placed the pot car track over which the heated ingots are transferred by means of the electrically driven pot cars to either mill. The building covering the pit furnaces has a span or main building of 56 feet 6 inches and of the leanto covering the reversing valves 18 feet 7 inches. Total length of building is 285 feet.

The main building is provided with roadways for the four vertical charging machines for pit furnaces. The machines are of 6-ton capacity and a lift of 15 feet. These machines were the first ones built that had the gripping action of the tongs as well as all the other movements performed by electric motors. Along one side of the building is a platform provided for the convenience of the operating men as well as for aiding the men in making the usual repairs on the charging cranes. On the other side of the building and underneath of the leanto rool are suspended two platforms, wrere are located all the hydraulic valves for operating the pit covers as well as the controllers for operating the pot cars. Each pit furnace contains four pits 5 feet 3 inches square, each one large enough to hold four ingots. Each two pits has its own reversing valve and damper. The fuel is natural gas. The pits are lined at the slag line with chrome or magnesite brick to resist the cutting action of the slag and the under side of the bottoms are provided with ample air cooling surface to preserve the bottoms.

The whole furnace is well tied by corner binders and rods and occupies a width of 29 feet 1 inch outside of brick work and a height of 21 feet 2 inches from cellar floor to top of pits. The stack is 3 feet 8 inches diameter inside of lining and 103 feet 8 inches high.

40-Inch Blooming Mill.

The mill is a reversing mill of very massive construction, the housings weighing about 90,000 pounds each. The rolls are steel castings and long enough to allow five passes differing in widths from 22 inches to 4⅜ inches and suitable to roll any section from 22x2 inches slab to 4x4 inches billet. The diameter of body of roll when new is 29½ inches and the diameter of neck is 22 inches. The screws for adjusting the top roll are operated by hydraulic cylinder and gearing, the roll being counterbalanced by levers and weights. The window of the housing is wide enough to allow changing of rolls through this window.

The front and rear mill tables are of exceptionally heavy construction, the rollers being 16 inches in diameter and 7 feet 1 inch long between journals, the journals being 6 inches diameter and 15 inches long. The journal bearing caps are secured in place by only two bolts each to facilitate repairs. The sections of table beams nearest to the mill are steel castings to insure extra strength. The side guards on front table opposite the manipulator and extending to the mill end of table are made in sections of steel castings so as to enable same to withstand the blows from the ingots when these are turned by the manipulator. The lengths of front and back tables from center of rolls are 55 feet 9 inches for each table.

All the rollers in each table are driven by bevel gearing from line shafts directly connected to one 12x12-inch reversing engine for each table. These line shafts also drive two rollers each having their bearings in the roll housings on each side of the rolls thereby avoiding the use of the customary dead plates nearest to the rolls. The approach table extending from the soaking pits to the mill table is of a length of 84 feet and made in two parallel halves, one half being the ingot run and the other half an idler table for supporting the ends of the nearly finished billet or slab shapes.

The ingot run contains solid rollers 12 inches in diameter which are driven through mitre gears by a geared 50-horsepower motor. This motor is controlled from either the roller pulpit or from the soaking pit building by means of a controller at each place, so as to enable the pot car boy to run the ingot up to the switch at the further end of table, while the roller is finishing the former ingot, after which the roller runs the ingot into the mill table. The manipulator motions, the adjustment of top roll and the reversing and controlling

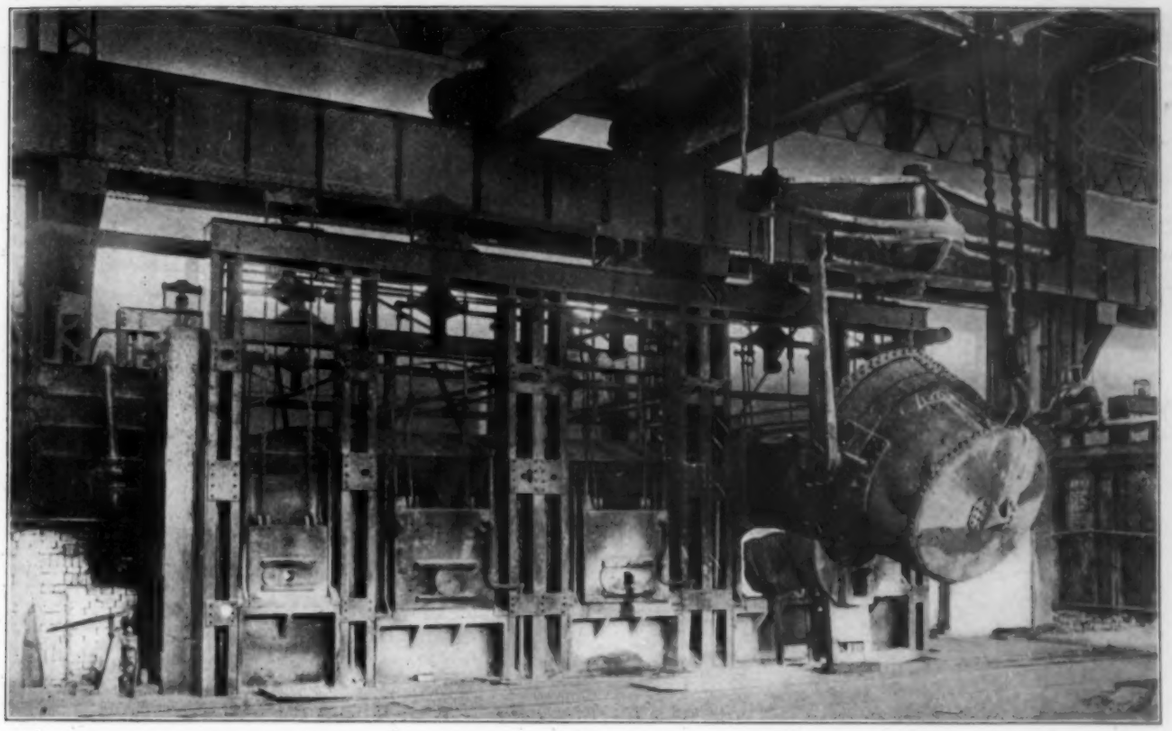


FIG. 3.—FRONT VIEW OF OPEN-HEARTH FURNACE, SHOWING 40-TON CRANE POURING MOLTEN METAL INTO FURNACE.

of the engines are all governed by operators on the roller's pulpit which is located right above the mill table and about 42 feet from the rolls.

The engine is a 55x60-inch twin cylinder reversing engine geared 1 to 1 to the jack shaft which is coupled to the mill pinion. The engine is equipped with a steam reversing gear and piston valves. The pistons are carried by heavy piston rods supported by tail rod shoes outside of cylinder heads. A hydraulic shear is placed in the table at a distance of 89 feet from mill. This shear is intended for cropping ends of ingots that may split when being rolled, as well as being an emergency shear in case the regular shear would be disabled. Beyond this shear and at a distance of 92 feet 10½ inches from same is located the regular billet and slab shear for cutting blooms, billets and slabs to the required lengths.

This shear is engine driven and capable of cutting all sections up to 8 inches thickness and 22 inches width. All the shear tables as well as the loading table are driven by electric motors; the main shear table by a 50-horsepower motor, the tilting table and the loading table each by a 19-horsepower motor.

The rear shear table is about 16 feet long and provided with rollers 12 inches center to center, so as to successfully convey short lengths. The table is a tipping table, having its fulcrum in the back, the front being raised or lowered by an hydraulic cylinder under control of the shear man. In its highest position this table is level and at the same elevation as the front shear table. This arrangement enables the operator to shear the last piece of each ingot to greatest useful length by supporting the piece in the level position until the knife descends on the piece. The table is provided also with a longitudinally sliding motion under the control of the shear man. This feature enables the operator to provide large enough opening between end of table and shear knife to drop the scrap into the scrap conveyor. A disappearing idle roller is also provided to fill the space between the loading table and the shear table when in its most forward location so as to prevent short pieces from dropping down between tables.

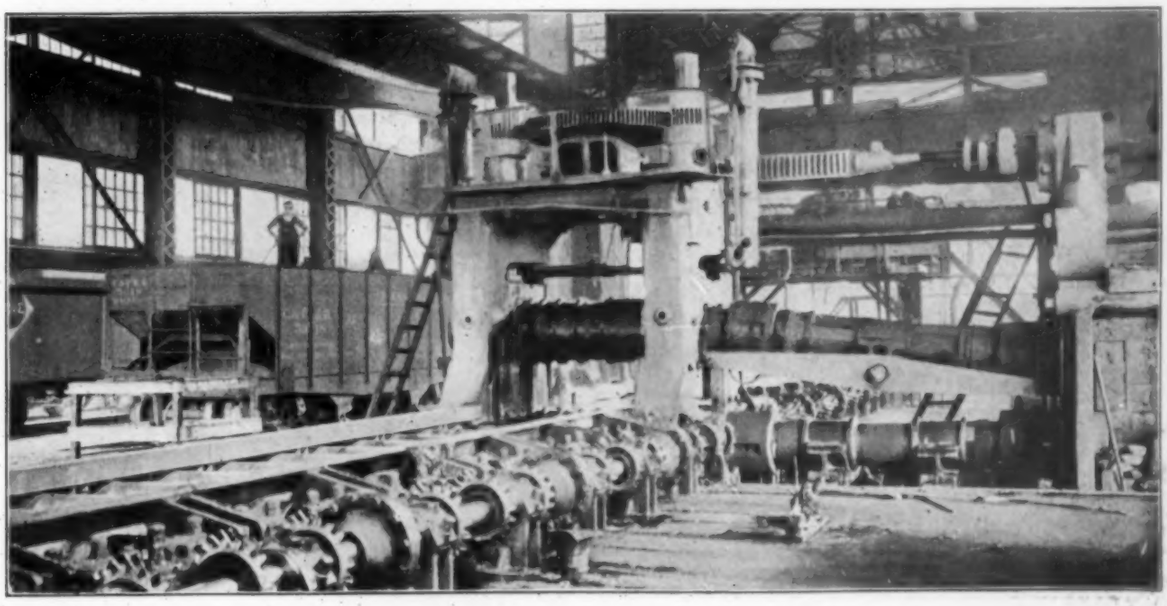


FIG. 4.—FORTY-INCH MILL PROPER AND REAR MILL TABLE.

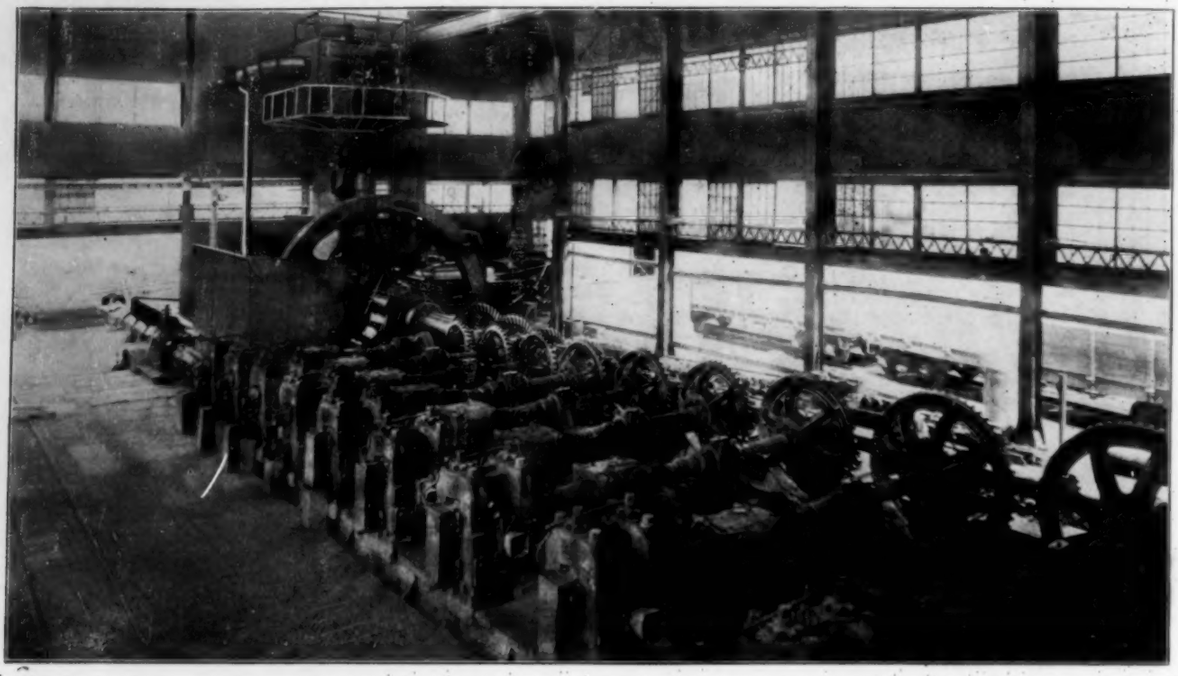


FIG. 5.—VIEW OF 14-INCH CONTINUOUS MILL AND ENGINE, LOOKING TOWARD ENTERING END OF MILL.

The loading table, forming a continuation of the rear shear table is about 20 feet long and equipped with a steam pusher for skidding the product across the table and down an incline on to cars. An adjustable and removable stop is also placed behind the pusher so as to stop any piece opposite the pusher that may have to be loaded on cars. The motors driving the rear shear table and the loading table are controlled by an operator on an elevated platform affording him a clear view of all the machinery under his control. This same operator manipulates also the removable stop over the latter end of the loading tables, the pusher for skidding the product off the table on to cars and the car pusher, which spaces and shifts the cars in front of the loading chute on the table. The removable stop can be raised high enough to allow the ingot rolled out to a cross section of 4x6 inches to pass on to the 14-inch continuous mill to be rolled out to billets from 4 inches square to any section down to 1½ inches square.

All the shear tables and the loading table are spanned by a 15-ton overhead electric traveling crane whose roadways are supported by the building columns so as to facilitate the ordinary repairs. This crane is also equipped with a 5-ton auxiliary hoist. Over the mill and engine is provided a 50-ton electric traveling crane, which is equipped with a 10-ton auxiliary hoist. At the end of the loading table is provided a track on which are stationed a couple of cars furnished with boxes for removal of scrap ends that may be too long for the regular scrap conveyor or for taking care of all the scrap in case the conveyor should be out of repair.

Shipping Yard.

Outside of the shear building is provided a stock and shipping yard where the blooms, billets or slabs are cooled, inspected and loaded on cars ready for shipment. This yard is 60 feet 2 inches wide and 490 feet long and provided with two 10-ton overhead traveling cranes for handling the material. These cranes are also equipped with auxiliary hoists of 2-ton capacity each. This mill has proven very efficient and has furnished a monthly record of over 33,000 tons, of which about half the product was rolled to 4x6-inch sections or less.

The Pressed Steel Car Co. has reported earnings for nine months ended Sept. 30, showing, after allowing for the interest on outstanding gold notes, preferred dividends

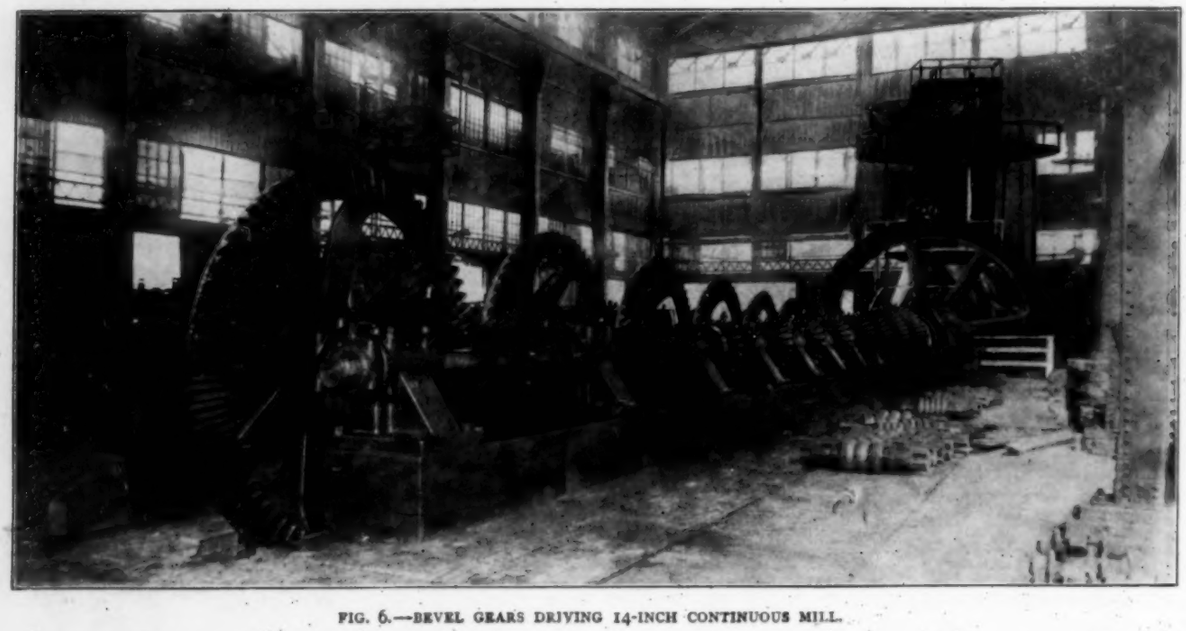


FIG. 6.—BEVEL GEARS DRIVING 14-INCH CONTINUOUS MILL.

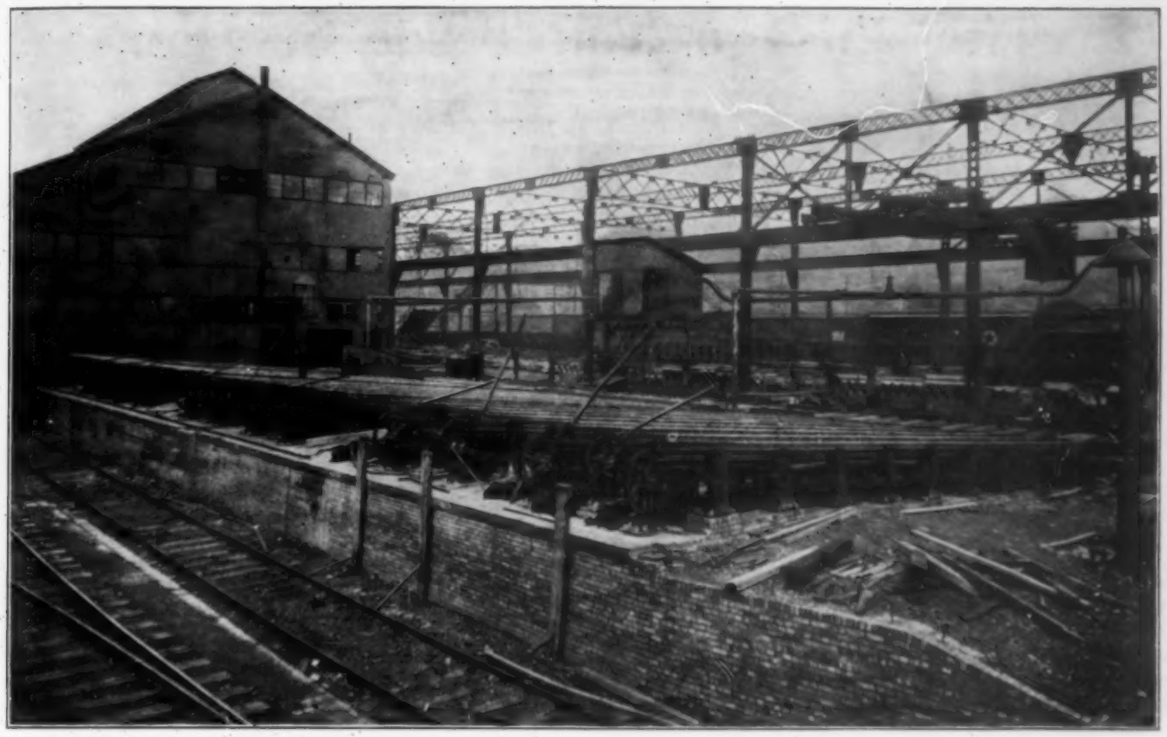


FIG. 7.—GENERAL VIEW OF HOT BEDS AND LOADING TRACK FOR 14-INCH CONTINUOUS MILL, AND CRANE STRUCTURE OVER SHIPPING YARD FOR 40-INCH BLOOMING MILL.

and depreciation, a surplus of $2,258,429, which amount is applicable to dividends on the common stock. Assuming that the last quarter in the year will show surplus earnings equal to the average of the three other quarters, the total amount available for common dividends at the close of the year will be over $3,000,000, being equal to over 25 per cent on the common shares. The company allows $210,723 for depreciation during the nine months, and values its property and franchises at $25,615,832.

The directors of the Consolidated Lake Superior Co., which has just effected a loan of $3,000,000 to assist the concern in carrying on its business, held a meeting at Philadelphia Dec. 26, to consider changes in the organization necessitated by the financial arrangement. In order to make places on the board for representatives of the banking syndicate which advanced the loan F. S. Lewis, W. P. Douglas, Edward C. Lee and James Butterworth resigned and their places were filled by Charles McDonald and Charles H. Tweed, of Speyer & Co., New York; Horatio G. Lloyd, president, and Thomas DeWitt Cuyler, vice president of the Commercial Trust Co. of Philadelphia. Joseph S. Swartz, who has been a member of the board for several years, was made vice president to fill the vacancy occasioned by the resignation of E. C. Lee.

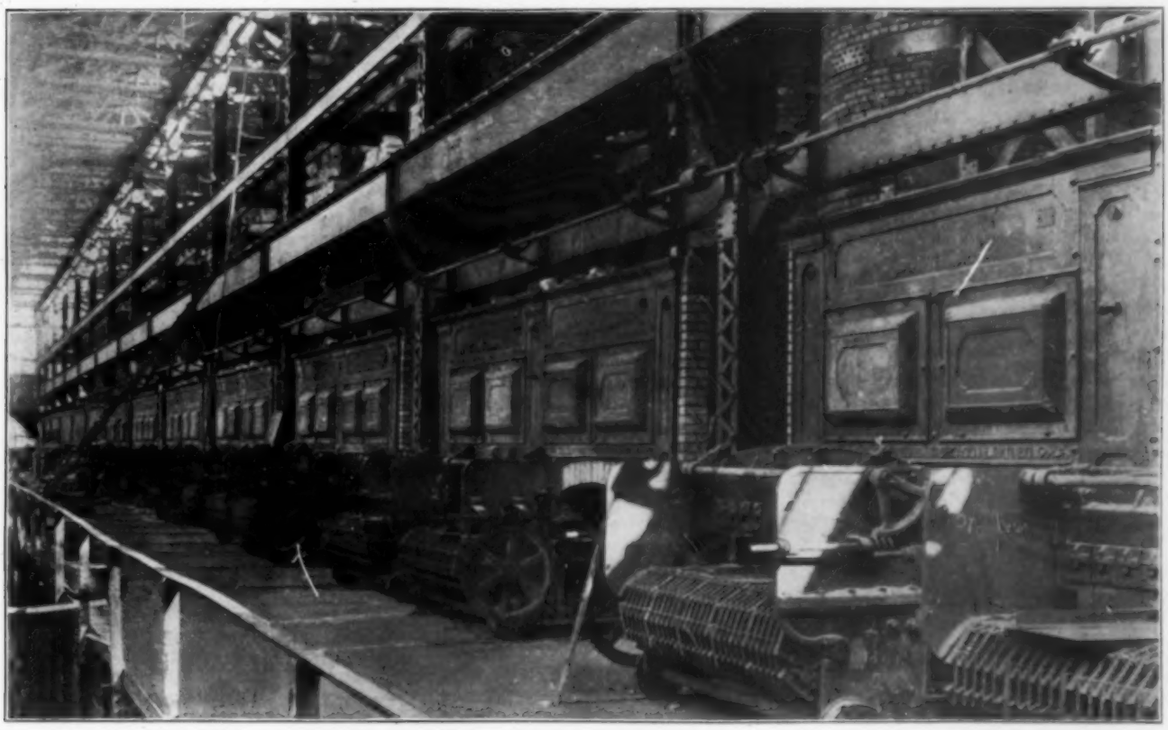


FIG. 8.—INTERIOR VIEW OF NO. 4 BOILER HOUSE, SHOWING CAHALL VERTICAL BOILERS EQUIPPED WITH CHAIN GRATE STOKERS.

The Chicago Iron Trade in 1902.

BY GEORGE H. GRIFFITHS.

The year that has just closed marks an epoch in the iron and steel industry of this country. It will be long remembered as a year of peculiar conditions. In almost all lines the demand was greater than the supply, notwithstanding the large increases to the productive capacity of the country that were made in 1902 and the year preceding. The average delivered price of the crude and finished product, with but few exceptions, was higher than for many years past, premiums being paid during the major portion of the year for such material as could be obtained for prompt shipment. Higher prices were reached in 1899, but the average in that year was not so high as in 1902. The heavy importations of pig iron, billets, sheet bars and finished steel will also make the past year a memorable one; and it will stand out prominently also as a year during which a record was made in the amount of new construction undertaken.

The year has not been without its drawbacks to production and consumption. The absolute inability of railroads to handle the tremendous traffic of the country with despatch and promptness, was the most serious factor, though the anthracite coal strike in Pennsylvania and the incipient strikes among the coal miners of Virginia, West Virginia and Alabama, the blast furnace workers of the Central West and the protracted strike of puddlers and finishers in Eastern Pennsylvania mills added to the difficulties of the situation. But, generally speaking, labor troubles among workers in iron and steel mills were of no great importance, and the points of difference were soon settled. Had conditions in kindred lines of business been as favorable to high production as were those in the iron and steel industry, the figures showing the production and consumption of these products, with their values in dollars and cents, would have amazed the industrial world.

The unparalleled activity in iron in 1902 is amply illustrated by the large increases in the producing capacity of the country projected during the year, taken from a summary of new construction printed in *The Iron Trade Review* of July 31. The showing is a most impressive one, and well worth the study of every manufacturer of iron and steel. At that time, there was under construction 34 blast furnaces, with an annual capacity of 4,300,000 tons; 12 blast furnaces were being remodeled and enlarged, providing 600,000 tons additional annually. The total estimated addition to the blast furnace capacity, all expected to be available before the end of 1903, was 4,900,000 tons a year.

The open-hearth furnaces under construction were 103, with an annual capacity of 2,700,000 tons. Open-hearth furnaces planned, 15, with a capacity of 400,000 tons annually. Open-hearth furnaces building for steel foundries, 21, with an annual capacity of 200,000 tons a year. Total additional open-hearth capacity available by the close of 1903, 3,300,000 tons a year.

There were 67 new sheet mills under erection, with an annual capacity of 200,000 tons. The new tin plate mills under construction by independent interests were 59, with an annual capacity of 120,000 tons. The list of miscellaneous finishing mills building included five modern plate mills, with an annual capacity of 500,000 tons. The new tube, bar, hoop, wire and structural mills planned and building were of a capacity difficult to estimate, but judging from the capacity of connected open-hearth furnaces, probably equivalent to 1,250,000 tons to 1,500,000 tons of finished material a year, all of it expected to be available by the end of 1903.

Increases to the coke producing capacity of the country, as shown in a summary printed in *The Iron Trade Review* Oct 30, include 14,708 bee-hive ovens under construction and projected. Estimating the annual production at 600 net tons per oven, this will add 8,824,800 tons to the product of the country. To this should be added the increasing capacity of the retort or by-product ovens, of which there are 858 under construction, while 1,490 additional are to be built in 1903. As the average annual output of these ovens is 1,000 tons, this industry will further increase the coke production to the extent of 2,347,000 tons, making a grand total which will be available Jan. 1, 1904, of 11,171,800 tons. The regular production amounted to 21,795,883 tons for the year 1901.

Features of the Year's History.

The year 1902 is reminiscent of 1899 and 1895 in the steady upward march of prices which marked it, though differing from those years in several respects. Pig iron was most notable for its advance. Northern No. 2 foundry going $11.65 higher than the price at which it sold at the opening of the year. Many sales were made above this figure, but such transactions could scarcely be taken as a criterion since special conditions entered into most of them. Bar iron advanced from $33 to $39 a ton; Bessemer steel bars, from $33 to $35; plates, from $35 to $43; structural steel, $35 to $43, and other products proportionately. The break in these high prices came toward the close of the year, which was forced in the case of finished material by the active competition of independent interests. One feature of the year's trading, worthy of special comment, is the fact that through it all, the United States Steel Corporation used its commanding influence on the side of conservatism. Not only did it not advance its quotations on most of its products, but this corporation was responsible in a great measure for the lowering of values which came at the close of the year. Until its capacity was sold up, the company accepted orders for rails at $28; for plates, at $35; for structural steel, at $35, and other products at established prices; and when it had nothing further to offer, it withdrew from the market. The high prices were made by other interests, and jobbers were able to get large premiums for early deliveries. Early in October reductions were made in the price of sheets and wire goods, and later merchant pipe was reduced. The demand for all these products has since increased. Smooth wire was cut $4 a ton; painted barb wire and galvanized barb wire, $8 a ton; wire nails, $3; sheets, $7 a ton, and merchant pipe, $16 a ton.

Western furnaces and foundries, in common with like interests all over the country, suffered in the great scarcity of coke which prevailed throughout the year under review. This condition was not due to any shortage in the fuel capacity, but to the pronounced failure of the railroads to provide sufficient facilities. Cars were lacking, but the locomotive shortage was the greater drawback, and added to this was the great inadequacy of terminal facilities. There was at all times ample supply of coke stocked at the ovens. All the furnaces in the West had to bank and some blew out several times, remaining idle for varying periods as a result of their inability to get fuel; and many foundries had to lose one and two heats a day on the same account. High premiums were paid for coke that could be delivered promptly, the market price reaching $12 a ton. Colorado ovens furnished a temporary relief, but this supply was soon exhausted, the bulk of it having been sold at $8 to $10 a ton. Further anxiety to consumers of coke was caused by the announcement in October by the United States Steel Corporation that none of the product of its Connellsville ovens would be offered for sale in 1903, except to those furnaces that supplied it with pig iron. Yet the feeling of alarm was allayed subsequently by the publication in *The Iron Trade Review* of a detailed list showing the number and capacity of coke ovens under construction by independent interests, guaranteeing ample output for all the needs of the country.

The scarcity of coke during the year, creating a famine in pig iron, made necessary large importations of foreign iron to supply the domestic deficiency. A considerable tonnage from Great Britain and Germany found its way to Western foundries, though the bulk of it was sold east of Chicago. Foreign pig iron was sold in this city on a guaranteed basis of 2.5 percent silicon, and from $24 a ton delivered, at which it was first offered, it advanced to $27.50. There was also a heavy demand in the West for foreign billets, structural material and rails. A leading local importer reports that its sales of foreign steel exceeded 100,000 tons, most of which was German

basic Bessemer and basic open-hearth billets. Western interests took 40,000 tons, or thereabouts, all basic Bessemer billets. These were sold on the basis of $27.50 to $28 for 4x4 inch billets, in lots of 5,000 tons and upwards, delivery at Atlantic seaboard, duty paid.

During the year the Thomas furnace at Milwaukee, the Iroquois furnace at South Chicago, and the Zenith furnace at Duluth were completed and put in blast. Construction was also begun on a new furnace by the South Chicago Furnace Co., at South Chicago. The Inland Steel Co. completed its plant at Indiana Harbor, Ind., and work was commenced on a steel plant at South Chicago by the Deering Harvester Co. (since absorbed by the International Harvester Co.) consisting of an open-hearth plant of 14 furnaces, of 40 tons daily capacity each; 8, 9, 12 and 16-inch merchant mills; 22, 26 and 28-inch plate mills and a 32-inch blooming mill. The daily output will amount to 600 tons, all of which will be consumed by the company. The Waukesha Sheet Steel Co., Waukesha, Wis., had to close its plant for an indefinite period during the year owing to its inability to get a sufficient supply of steel. Efforts were made at different times to consolidate the independent bar iron mills of the West, but each attempt failed.

Pig Iron.

The highest price paid for Northern No. 2 foundry, in 1901, was $15.50, and the lowest price, $14. On Southern No. 2 foundry, the range was a little greater. The highest price quoted was $15.15, and the lowest, $13. In 1902, the lowest quotation on Northern No. 2 foundry was $15.50, Chicago, and the highest $27.15, which was paid for iron for prompt shipment. On Southern iron, the lowest price quoted for No. 2 foundry, was $15.15, and from this figure it jumped to $27.15 before the year closed, though there were isolated sales at higher prices.

Many conditions have existed during the year to give the pig iron market a bullish tendency, and the high prices that have been reached do not necessarily mean that producers have made big profits. The bulk of the iron delivered in 1902 was sold when the price was low, the extreme high prices being asked only for spot delivery. Two causes may be named for the scarcity in pig iron—the incapacity of railroads to haul fuel to furnaces and iron to consumers, and added to these was the anthracite coal strike. When the strike ended, so great was the need for hard coal all over the country, that every available car and locomotive was kept in this traffic until the immediate wants of the nation had been supplied. With scarce an exception, every furnace in the West and Central West, was compelled to bank or blow out numerous times, owing to inability to procure fuel. The price of coke advanced to an almost prohibitive figure, sales being made at $12 and $14 a ton. No contracts were lived up to, and furnacemen as well as foundrymen, had to seek the open market and pay the exorbitantly high prices that were ruling for such coke as they could procure. Shipments of Colorado coke relieved the tension to some extent, but this supply was soon exhausted. To only a small extent did producers avail themselves of the high prices that were being obtained for spot iron by deflecting the product produced under such high costs to those channels. In general furnaces made every effort to fulfill their contract obligations; but no company has been able to deliver the full tonnages booked and all will carry over into next year several weeks' deliveries on 1902 iron.

The pig iron producing capacity of the West for the first half of the year was sold early in January, and before the expiration of June practically the entire product of Western and Southern furnaces for the year had been disposed of. The demand for spot iron commenced in January, and became more urgent as the year advanced. It became apparent early in the year that the amount of domestic iron made would not be sufficient to meet the needs of the country. The importation of foreign iron in this district began in August, orders having been placed earlier, and while not so great a tonnage was sold in this market as in the East, it nevertheless was large. The bulk of the iron sold here came from England and Scotland, though some was imported from Germany. In composition, the English iron corresponded to Dayton and South Pittsburg grades, while the Scotch was similar to the domestic product known as Ohio Scotch and Hubbard Scotch. All the iron was sold on a guaranteed percentage of 2½ silicon. It was first offered in this market at $24 a ton, advancing ultimately to $27.50. The demand soon fell off, however, as Western foundrymen did not take kindly to it, because of their ignorance of methods of mixture. Iron from the South was also offered freely for spot delivery. Probably the chief purchaser of the foreign product was the leading manufacturer of cast iron pipe.

On Jan. 1, 1902, eleven Western furnaces were either banked or blown out because of the scarcity of fuel. Iron for prompt shipment was in active demand, and commanding premiums of $1 to $2 a ton. Quotations for forward delivery were on the basis of $15.50 for Northern No. 2 foundry, and $15.15 for Southern No. 2 foundry. There was active buying for deliveries extending through the first half of the year, and before the month closed, all producers had withdrawn from the market for that period. February was marked by a panicky haste on the part of consumers to place contracts for the last half, and buying from Southern furnaces was general and heavy. Northern iron advanced $2 during the month, forward deliveries being booked on the basis of $17.50 Chicago for Northern No. 2 foundry. Southern iron was held at $16.65, and from 50 cents to $1 a ton additional was paid for both grades for prompt shipment. A meeting of the Southern furnacemen was held in New York in March, and it was decided not to change the $12 Birmingham basis, owing to the nervous condition of the market. No Southern iron was selling or had been offered since the first weeks of year at this quotation, and their action therefore had no material effect on prices. There was no fixed basis of values. Each transaction was a law unto itself, the price of iron sold being determined by the credit of the customer, the size of his order and the delivery required.

Local No. 2 foundry for delivery within three months, was held at $19 Chicago, and Southern No. 2 foundry, at $18; for deliveries in the last half, the prices asked were shaded 50 cents to $1 a ton. Coke shipments continued bad throughout April and May, several furnaces having to bank one or two days at different times. There was a good demand for spot iron during these months, but little buying for forward deliveries, transactions being limited to carload lots for prompt shipment. Southern iron advanced to the basis of $16 Birmingham in May, but sellers sold only a small tonnage at this price, as $17 to $18 was easily obtained. For spot delivery, No. 2 foundry sold at from $22.65 to $23.15, Chicago, during the month. In June, there was a good volume of trading for deliveries in the first half of 1903. Malleable works also bought a good tonnage of Lake Superior charcoal iron, which they were compelled to use on account of the scarcity of malleable grades. The anthracite strike resulted in the suspension of operations at many furnaces this month. It also caused a rapid advance in spot iron, $25.15 to $25.65 being obtained during July for No. 2 foundry. There was heavy buying during this month for deliveries through the first half of 1903.

During the balance of the year, trading in pig iron was devoted to a large extent to supplying immediate needs. The prolongation of the coal strike, which was followed in October by an incipient strike among the coal miners in Alabama, seriously retarded shipments of coke to Western and Southern furnaces, necessitating the banking of every stack, for varying periods, at different times. Melters also suffered from the scarcity of fuel and pig iron, and had to close their shops or operate at the loss of one or two heats each day.

In September, the freight rate from Southern points was advanced 50 cents a ton, or to $4.15, Birmingham to Chicago. No. 2 foundry advanced in this month to $27.15, fluctuating between this point and $28.15 during October and November. In December spot iron weakened and could be bought at $25.65 to $26.15. The large consumption of cast scrap during the year created an unusual demand for high silicon iron, and sales of Jackson County silvery, 8 percent silicon, were made at $32.10; 7 percent silicon, $31.60; Southern silvery, 5 percent silicon, $30. Higher prices than these were many times realized, but these quotations are a fair representation of the prices ruling.

After July, iron for any delivery in 1902 was regarded as coming within the sphere of "spot shipment," though prices were shaded slightly on orders for delivery a month or six

weeks ahead. In August, for shipment in 1903, Northern No. 2 foundry was selling at $23.75 and Southern No. 2 foundry at $22.65 Chicago delivery. In September, the freight advance of 50 cents increased the cost of Southern iron to $23.15, and later in the month it advanced to $23.65. Sales of Northern No. 2 foundry during October, for shipment in the first half of 1903, were made at $23, and this figure remained the quotation the balance of the year. In November, leading Southern producers opened their books for the last half of 1903, on the basis of $20 Birmingham, making the price of Southern No. 2 foundry at Chicago $24.15, though isolated furnaces asked $1 a ton more. Very little interest was shown by melters in buying for this delivery, however, and the market commenced to weaken. Early in December, it dropped 50 cents, and later fell to $18.50 and $19 at the furnace. Before the year closed, producers were accepting contracts for any delivery, commencing from the second quarter, at $23.15 Chicago. Spot iron also weakened in the last weeks of the month, and sales were made at $24.15 to $25.15, Chicago.

Bar Iron and Steel.

Bar iron showed in the year the two extremes of an active and dull market. Steel was a steady seller almost the entire year, and though producers suffered from the scarcity of specifications that prevailed in the last four months, it was not felt to the same extent as in bar iron manufacturers. The irregularity in the sale of iron from June to December, was the more surprising in view of the fact that Central Western mills had no trouble until within the last month in getting orders on the basis of 1.80c Pittsburg. In the first half of the year the capacity of Western bar iron mills was wholly unequal to the demand, while the last six months were marked by periods of depression and constant changes in prices, resulting in the withdrawal of leading producers from this market and the closing of several mills. The reason for this weakness was due mainly to the wide difference in the price of the two products; though the fact that consumers generally overbought in the first half aided in bringing it about. Owing to the high cost of scrap and pig iron all through the year, manufacturers of bar iron were compelled to increase their prices, until they exceeded by $4 a ton the cost of steel. This quotation they were unable to hold, for wherever possible consumers substituted steel for iron. The year's business was closed with iron held nominally at 1.80c (though in November and December this was shaded on desirable orders) and steel at 1.75c.

In the closing months of 1901 there was heavy buying of bars, and at the opening of 1902 the Western mills had sold their capacity for three months ahead. Both products were held nominally at 1.65c each, though premiums were paid to get prompt shipment, the congested condition of railroads making mill deliveries uncertain. Buying for delivery in the first half was active throughout January, consumers generally exceeding the tonnage in their contracts and placing supplementary orders. In the last week of the month, iron was advanced $2 a ton. The demand did not lessen during February, though steel producers booked a larger tonnage than in the preceding month, as a result of the increased cost of iron. All classes of consumers had passed through a prosperous year, and stocks were generally depleted, which created an insistent demand for material for quick shipment. So heavy was the buying during February, that the capacity of all the mills was well taken for the first six months of the year, and further business was declined at the time owing to the advancing costs of scrap and pig iron. Early in March, as a result of similar action taken by Pittsburg sellers, both iron and steel were advanced $2 a ton, making the quotation of the former 1.85c and the latter, 1.75c. Consumers that had not covered for their needs for the last six months of the year were allowed until the first of April, however, to place orders for that delivery on the old basis. Heavy buying followed this announcement, contracts aggregating fully 200,000 tons being closed in the last week of the month. On April 1 iron was again advanced $2 a ton, or to 1.95c. Mills were unable to hold this quotation long, jobbers and steel producers competing actively with them for new business; and before the expiration of May round lots of iron were selling at 1.85c to 1.90c. Steel mills continued to book the bulk of the business offered as a result of the lower price, and during June, to offset this advantage, sales of iron were made at 1.75c the nominal quotation then being 1.80c. July was a light month. Leading producers made a determined effort in July to maintain the 1.95c quotation, but failed because of the lack of unanimity on the part of other manufacturers. The favorable crop outlook strengthened the market in August, and improved the volume of specifications. Some good sized contracts were also placed in this month and iron closed strong at 1.85c for large lots, and 1.90c for carload orders. In October the leading local producer of iron withdrew from the market, the high cost of raw material making it unprofitable to sell the finished product at the quotations ruling. The Emelyn Iron Works, at East Chicago, closed for an indefinite period. Reports were numerous of iron sold at 1.75c and as low as 1.70c though producers asserted that 1.80c was the minimum quotation. Specifications improved in December, railroads and carbuilders sending in full quotas and placing supplementary orders. Efforts were made at different times during the year to consolidate the independent producers of bar iron in the West, but all these attempts failed.

Rails.

At the commencement of the year, it was estimated that manufacturers had on their books, for delivery in 1902, orders for standard rails aggregating 2,000,000 tons, including the undelivered tonnage of 1901. The tendency of all the railroads in recent years has been to develop into greater tonnages of motive power and rolling stock, and this has necessitated tearing up miles of track and relaying with heavier sections. With very little increase to the manufacturing capacity and with every evidence of a demand that would far exceed that of previous years, railroad officials began in January last to sound the market for deliveries in 1003. The condition of rail mills for 1902 was shown in that month by the refusal of leading producers to bid on several large lots offered by Mexican and Southern railroads, for such deliveries as mills could promise in the year. Inquiries immediately commenced to flow in from steam and electric railroads and the United States Steel Corporation and independent rail mills, setting aside the precedent of the previous year of not selling material for deliveries extending beyond the current year, opened their books in January for the reception of orders for delivery in 1903. Many producers still had the capacity of the last months of 1902 unsold, and this was quickly taken up.

Orders were placed very freely, and it was estimated by the end of June that mills had contracted to the extent of 1,000,000 tons, of which the local interest contributed 300,000 tons, all for delivery in 1903. It was in June that rail manufacturers reaffirmed the price of $28 for standard sections for the ensuing year. This announcement further stimulated the demand, and before October passed into history practically all the mills of the country, including the local interest, had sold the bulk of their product for 1903. Buying was continued throughout the balance of the year, but mills would accept only such orders that allowed them leeway in the matter of deliveries.

With the capacity of the country sold so far ahead, it was natural that importations should be made to meet the current wants. New steam and electric roads were constantly springing into existence and new country being opened up; but these belated buyers had to depend on the foreign market to supply their needs, or use relayers. The importations to Nov. 1 were 40,388 tons as against 14,365 tons to Nov. 1 in 1901. Prices of the foreign product ranged from $28 to $35 delivered at the seaboard. Considerable speculation was done in rails during the year by dealers and investers, enhancing the cost to the consumer of material bought from these sources; and the intricacies of these trades, many of the sellers accepting relayers from railroads as part payment for new rails, make it the more difficult to determine a basis of value of such transactions.

The pronounced scarcity of new rails and the delays attending the deliveries of foreign material, created an extraordinary demand for relayers of all sizes, which showed no subsidence during the year. Railroads were quick to take advantage of the opportunity to dispose of their discarded material, and relaying rails found a ready market at all times at an average price considerably in excess of the cost of new

material. As high as $35 per ton was paid, but this no doubt represents the high-water mark. Demand for light rails during the year was active and uninterrupted with no change in quotations. The conditions surrounding the buying of standard sections did not affect the light rail market, and mills were able to give fairly prompt delivery up to the closing weeks of December.

Structural Steel.

Building operations in Chicago and tributary territory were on a larger scale last year than for a decade past. The activity was not confined to any one branch, but included residences, hotels, railroad depots, factories and office buildings. In the two years preceding, improvements to Chicago real estate had suffered from the strikes among building trades craftsmen and iron and steel workers, which postponed for an indefinite period many new enterprises. The year 1902 was not marked by any labor dissensions worth speaking of, and capitalists and manufacturers pushed to completion the plans they had for enlargements and improvements. The demand for structural steel was incessant, and the inability of mills to furnish material promptly deflected large tonnages to jobbers, who realized fancy premiums for such as they could furnish. A fair sized quantity of structural shapes was imported from Germany, but the difference in sizes and sections from those rolled in domestic mills made the use of this material limited, except where it went exclusively into building. At the opening of the year mills were behind in deliveries of heavy beams four to six weeks; light sections and angles, three to four months; universal plates, six to eight weeks, and sheared plates, four weeks. Buying for spring and summer deliveries was heavy early in the year, and before the expiration of February, the leading producers had sold their capacity for the next nine months. In March they announced that deliveries could not be guaranteed in 1902 on any further new business. There was no change made during the year in the pool price of $35 per ton for 15-inch beams, though independent producers and jobbers advanced the cost of all products at different times of the year, $40 to $42 for heavy beams being the closing quotation. Consumers commenced placing contracts for deliveries in 1903 in the fall of the preceding year, and by Dec. 31 many producers had three of four months' capacity taken.

Plates.

The plate market during the year has been without material interest. The pool price of $35 a ton, established in June, 1901, has remained unchanged and has been continued by the leading producer as the basis for orders booked for delivery in 1903. Demand in the first quarter of the year was only of moderate proportions, and the local mill was in position to fill specifications promptly. As spring advanced, orders increased and specifications grew larger. In March, jobbers advanced prices on lots from store or mill $2 a ton. In April, the local manufacturer withdrew from the market, having sold its capacity for several months ahead. In May, jobbers again advanced prices $2 a ton, mill shipments being quoted at $38 to $40. Later in the same month, jobbers announced a further advance of $3, a total advance of $7 per ton since the local mill withdrew from the market. In July, this mill announced that its capacity was taken for the balance of the year. This was the signal for further advances by jobbers and independent manufacturers, and prices were jumped to $43 for carload orders, and $46 to $48 for less than carload lots. These prices remained in force until October, $40 ruling in that month, and continuing at this figure until the close of the year. In August, mills opened their books for orders for delivery in 1903, and by October a leading Eastern interest had sold its capacity for the entire year. The local mill continued to book orders until November when it withdrew from the market, having contracted for all the tonnage it could manufacture up to next July.

Billets.

Sales of billets in this market during the year have consisted largely of the imported product. There have been no domestic Bessemer billets offered, mills consuming all they could make in their own plants. Domestic open-hearth billets have been obtainable in small lots, and have sold at $36 to $40, depending on analysis, tonnage and delivery required. Billets from abroad came almost exclusively from Germany. Basic Bessemer, 4x4 inches, in large lots, delivery at Atlantic seaboard, duty paid, were offered at $27.50 to $28; basic open-hearth billets were generally quoted $2 a ton above Bessemer, with the usual extras. It is impossible to determine a correct basis of values for the foreign product, as orders placed abroad differed in the amount of tonnage, sizes and quality, according to the uses for which the material was required, the quotations changing proportionately. The leading local importer reports that its sales of German billets during the year amounted approximately to 100,000 tons, of which 40,000 tons, mostly basic Bessemer, were sold to Western consumers.

Sheets.

The sheet market has not been strong during the year. The large increases to the productive capacity of the country created active competition in the last half, and independent producers cut prices almost at random to secure the business offered. Variations of $2 to $5 a ton from the base price of $63 for No. 27 black were common, and in October, to offset this competition, the American Sheet Steel Co. announced a reduction on all gauges of black sheets, on all orders calling for 500 bundle lots or over, of $5 a ton. With this sweeping reduction in effect, and the advancing cost and scarcity of the raw product, many independent mills were practically placed out of business. However, the larger outside interests continued to compete actively in this market, and the price of $56 was shaded on desirable business. The year closed with waning interest in the market, No. 27 black being held nominally at $55 a ton, and galvanized sheets at $71.

Wire Products.

There was a good demand for wire products of all kinds during the greater part of the year, and not until the latter part of summer was any weakness felt. In January, smooth wire was held at 2.10c; painted barb wire, 2.70c; galvanized barb wire, $3, and wire nails, 2.15c. In February prices advanced $1 a ton, and continued on this basis until August, in which month they reverted to their former level. Buying was of small proportions, however, notwithstanding the fact that farmers everywhere had reaped large and profitable crops. Independent producers were shading prices to induce buying, and in October the leading interest, in line with its policy in readjusting its prices on all finished products, announced reductions in smooth wire of $4 a ton; painted barb wire, $8; galvanized barb wire, $8, and wire nails, $3. Immediately orders commenced flowing in, and buying was further stimulated by the notice from railroads that freight rates would advance the first of the year to Western points. The demand was exceptionally strong for wire nails, poultry netting and open fencing, many jobbers laying in large stocks for their spring trade in the fall months of the year. The year closed with the following quotations in effect: Smooth wire, annealed, 1.90c; galvanized, 2.20c; painted barb wire, 2.30c; galvanized barb wire, 2.60c; wire nails, $2; cut nails, 2.20c; polished staples, 2.15c; galvanized staples, 2.45c.

AVERAGE MONTHLY PRICES OF IRON AND STEEL PRODUCTS IN CHICAGO, IN 1902.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Lake Superior Charcoal Iron	$18.95	$20.00	$20.25	$21.00	$22.60	$23.50	$23.80	$26.50	$27.00	$26.20	$26.00	$25.75
Northern No. 2 Foundry	15.80	16.75	18.62	19.75	21.50	22.50	23.40	24.66	27.15	27.15	26.90	25.55
Southern No. 2 Foundry	15.45	16.36	18.37	19.25	20.82	22.77	23.79	25.77	27.15	27.15	26.90	25.55
Bar Iron	33.80	35.00	37.00	39.00	37.60	36.00	36.20	38.00	37.75	36.80	36.00	35.75
Rails	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Tank Plates	35.00	35.00	35.25	36.25	38.60	43.00	43.00	43.00	43.00	40 60	40.50	41.00
Sheets, No. 27	63.00	63.00	63.00	63.00	63.00	63.00	63.00	63.00	63.00	57.60	56.00	55.50
Old Rails	21.00	21.50	22.50	23.37	24.00	24.00	24.00	24.00	24.50	24.50	24.50	24.00
Old Wheels	16.50	17.00	17.50	18.87	19.10	19.50	20.00	20.00	20.50	21.10	22.50	22.50

NOTE.—Bar iron, tank plates and sheets in net tons; all others in gross tons.

Some New Things for the Shop, Chiefly by Way of the Patent Office.

A Magnetic Drawing Board and T-Square.

The holding of the T-square against the edge of the drawing board is one of these conditions which are generally accepted as inevitable and the same tolerance is extended to the setsquares; though in the latter case, of course, the trouble is less irksome, as the T-square is beneath them and renders a convenient support. All sorts of schemes have been proposed for the improvement of T-square awkwardness. Many of them, in fact, have looked to the ideal condition which would free the left hand from the duty of holding the useful but exacting instruments in position. Parallel motions, strings, wires, etc., have all given rise to various arrangements of less or greater complexity as the case may be; the head or stock of the T-square traveling in a slot at the side of the board with a spring pressing the head firmly against a straightedge and the slight friction being no detriment to the free use of the instrument and at the same time holding the device in position at any place selected. Another arrangement had a small idler pulley in the head of the T-square and a length of fine cord or wire passed from top to bottom of the board down the left hand edge, passing the pulley on the way and by pressing lightly on the outer side of the latter a tension was brought into play which forced the T-square and board together, the one end or other of the wire or cord being held

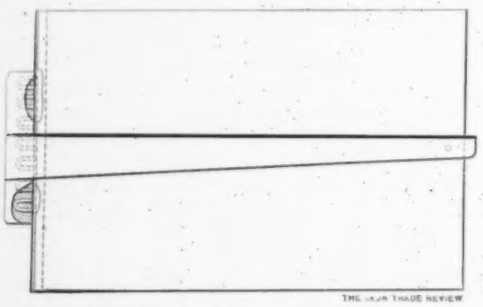


FIG. 1.—A MAGNETIC DRAWING BOARD AND T-SQUARE.

by a spring which kept a fairly uniform tension on the parts in contact.

An Englishman has been working on the problem and his solution is submitted in Fig. 1, which shows how magnetism has been brought into service to get over the difficulty already described. As will be seen, the stock of the T-square is fitted with a series of small horse-shoe magnets and the edge of the board is furnished with an iron strip, the latter being planed up to serve as an accurate and permanent guide for the former. The attraction is sufficient to cause the stock to cling to the board and to hold the T-square safely in position whether the board is horizontal or sloping, and at the same time the position is easily adjustable. The iron strip is ground true after fitting and the boards, which are made in standard sizes, have the usual brass slots to allow for the expansion and contraction of the wood. The manufacturers have applied the same thing to lecture room blackboards and it is evident that existing boards and squares may be fitted with the attachment. The growing use of the sloping board renders something of this sort more desirable than ever, and the introduction of these improvements will enable the draftsman to discard to a large extent the inconvenient attitude which has seemed his portion and be enabled to work with greater ease, comfort and possibly greater accuracy than of old. The makers of this device are W. T. Ellison & Co., Limited, Irlams-o'-th'-Height, England.

A Means of Fastening Collars or Pulleys to Shafting.

A method of attaching collars or pulleys to shafting has been designed and patented by Duane L. Potter, of Clifford, Pa. The arrangement will be readily understood by the engraving, Fig. 2. Here the collar is divided into two parts, A and B, which are so shaped as to be capable of being easily interlocked the one with the other. At the lower end of B is a projecting hook which fits into an opening cut in the corresponding part of A. There is an extension of the half A indicated at D, and this fits a cavity illustrated by the dotted lines seen in the upper part of B. This tongue D is securely held in the cavity, when the two halves of the collar are placed

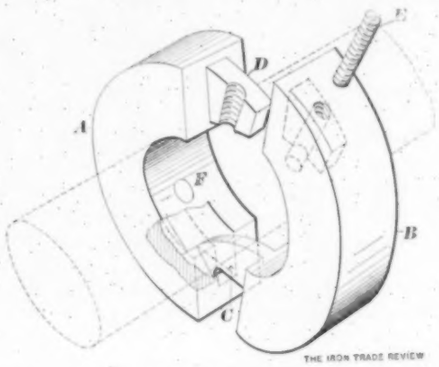


FIG. 2.—A MEANS OF FASTENING COLLARS OR PULLEYS TO SHAFTING.

in position, by a pin or blind screw E which passes between the tongue and the mortise and acts as a dowel.

A pin is also used to dowel the collar to the shaft, the latter being depicted by dotted lines. A hole is drilled in the inner side or bore of one half of the collar as shown by the letter F in the part A. It is understood that this hole need not be drilled through the casting of the collar and the pin or dowel may rest with one part in the hole F and the other half in a corresponding hole in the shaft. Those mechanics who have spent some uncomfortable moments with dowels which were to be fitted in this blind fashion, a style of fitting which has many good points, doubtless, after the thing is well made, but has some irritating characteristics in the making, will prefer a dowel which comes out in the open, as in the case of the screw E.

A Portable Automatic Hammering Machine.

A portable automatic hammering tool, so the patent specifications describe it, is presented in Fig 3, and the arrangement is suggestive of the constant pressure exerted in the direction of greater ease in the application of pneumatic tools and hence an added certainty of stroke. In the use of the automatic tools intended for hand application, such as the pneumatic tools in use for chipping cast iron or steel or for similar operations, the grip of the workman, after a time, suffers considerably from the jarring of the device. The present invention is intended to avoid this unpleasant action and by making it possible to handle the tool regardless of its weight, the inventor has also done something to make practicable the employment of larger units, so that more powerful pneumatic tools can be handled. The engraving shows on the upper and left hand side of the view an elevation of the apparatus and the accessories. The smaller view on the right is an end elevation of the hammer and support seen in the main view.

Referring to the engravings, A indicates any hammering tool driven by power through a flexible connection and adapted to be carried to the work by the operator. The tool illustrated is a pneumatic hammer of which B is the handle and C is the casing, the air supply being conveyed by the flexible tube attached to the handle in the usual way. The tool is generally held against the work in the position shown, the hand of the operator grasping the portion B and holding the tool up against the work. The jarring effect is then transmitted to the handle B, and this occurring repeatedly for a considerable time, has a decidedly unpleasant and prejudicial result upon the workman and the work. The inventor endeavors to prevent this to a substantial degree by providing that this transmission shall act upon a considerable mass of metal, more than is usually provided or is necessary for the ordinary opera-

tion of the tool. A convenient means of supplying the amount of mass is a weight D of any suitable shape and fixed directly and rigidly to the casing C. In order that the extra weight shall not be too great a burden to the workman in handling the tool, it may be supported by means of a chain connecting

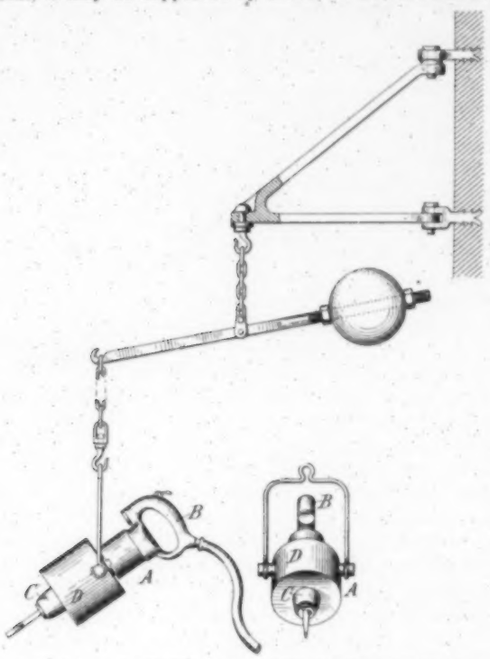


FIG. 3.—A PORTABLE AUTOMATIC HAMMERING TOOL.

with any point overhead and attached at the lower point by a swivel hook and a bail connected at about the center of the weight of the tool, so as to make it convenient to tilt around the trunnions as desired. A counterweight is attached to the end of the beam, and this, too, may be made adjustable as shown. The service of the tool need not be confined to the limited area shown by the engraving, but may be suspended from a crane or runway.

Attaching Couplings and Pulleys to Shafts.

Horace B. Murdock, of Detroit, Mich., has brought out a method of fastening couplings and pulleys to shafts which is illustrated in Fig. 4. This engraving shows a pulley to which the invention has been applied for the purpose of securing the hub upon the shaft. The slots are provided with three-cornered rods, A and A, the flat sides of the rods resting against the bore of the pulley and the apex of the triangle in each

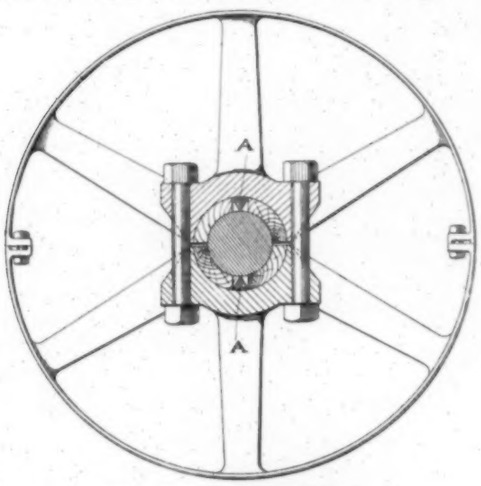


FIG. 4.—A PULLEY FASTENING.

case bearing on the shaft. When the device is clamped upon the shaft the pointed edge of the triangular rods grips the shaft and should any twisting force be exerted upon the pulley, the rods have a tendency to roll and thus cause them to have a greater pressure on the shaft. The greater the twisting force the greater the pressure exerted upon the shaft to prevent any motion by the triangular rods A A. The device shown is adapted to application to any ordinary pulley, as the bushings provide the keyways desired. The arrangement has special usefulness in the event of such an emergency as the breaking of a propeller shaft at sea, the inventor describing a coupling composed of four sections, each having a keyway for the triangular rods, and the whole designed for ready attachment to the ends of a broken shaft.

Some Bench and Pipe Vises.

A bench vise invented by John R. Long, East Akron, O., is illustrated in Fig. 5. It is that style of vise in which the gripping members can be turned together horizontally upon a common base and the jaws are automatically locked against rotation when anything is clamped in the

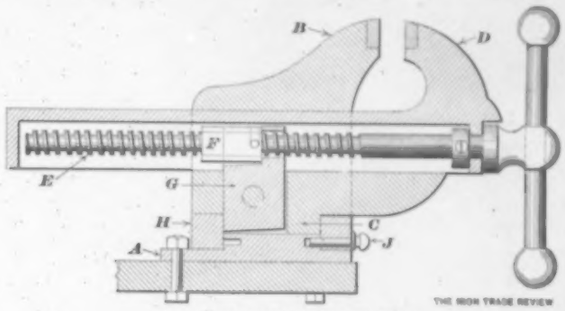


FIG. 5.—A HANDY BENCH VISE.

vise. There is a base A having an upper hub provided with a number of holes horizontally about the side and around this projection is a ring or collar which extends upwards a sufficient height to support and socket what may be termed the "fixed" member B of the vise. The lower part of B has a hub C fitting snugly but capable of rotation within the socket formed by the ring resting on A. The vise has a movable jaw D with an arm extending through an opening in the fixed jaw B and this arm is hollow on the under side for the entire length to receive the screw threaded shaft E. This shaft E passes through a nut F which is seated on the top of a dog G, the two latter being connected together by pins. The nut F is shown square in cross-section and abuts against the upwardly projecting portion of the dog G where it has all its bearing or pressure when the screw E is tightened to clamp any piece of work between the jaws of the vise.

Ordinarily the jaws are locked against horizontal rotation on the hub C when the jaws are forced together, but it sometimes occurs that rotation of both jaws together is desirable on certain kinds of work. The vise may be so turned on its axis, even when an article may be clamped between the jaws, by means of the ring H turning horizontally on the hub of the base A, the ring having a pin

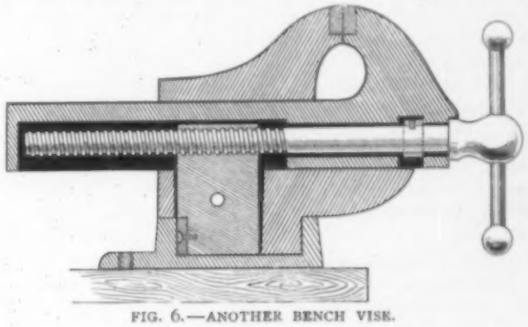


FIG. 6.—ANOTHER BENCH VISE.

J which may be engaged with any one of a series of index holes and thus locate the parts in any desired position. When the ring H is locked it serves the purpose of a rigid part on the base.

The vise illustrated in the sectional view in Fig. 6 is another design by the inventor of Fig. 5. This vise has also a swivel base and the locking is automatic with the tightening of the work in the jaws of the vise as in the other pattern. It is provided with a lever which is pivotally mounted in the body of the vise, and the upper end of the lever has a

screw-threaded opening to receive the screw of vise. The tightening up of the screw allows the upper end of the lever to rock toward the front of the vise and the lower end comes in contact with the inside of the socket base and thereby causes the vise to become locked against rotation. The lower end of the lever is fitted with an adjustable plate, whereby the lock can be adjusted to take up wear by placing paper behind it. A pipe-jaw attachment is illustrated in Fig 7. This can be

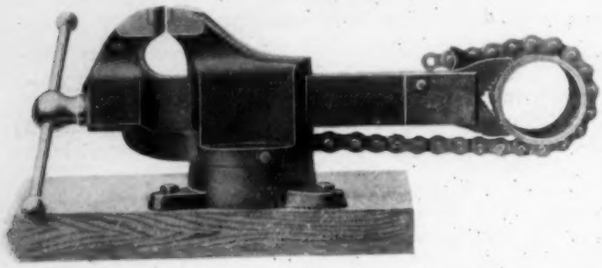


FIG. 7.—VISE AND PIPE JAW ATTACHMENT.

attached to any make of vise, when made to suit the width of the slide-bar. The chain is attached to the body of the vise underneath the slide-bar by means of a short pin and the other end of the chain is taken out around the pipe and fastened at the top of the pipe jaws. The adjusting of the chain around the pipe is the same as on a chain pipe wrench. The chain is let out or taken up instead of operating the screw of vise; thus you have the advantage of a quick-acting screw. The pipe-jaws can be easily changed to suit different sizes of pipe by simply removing the pin.

Mr. Long has also developed a line of pipe vises with the same improvements as described in connection with the other illustrations. One of these is shown in Fig. 8. These are

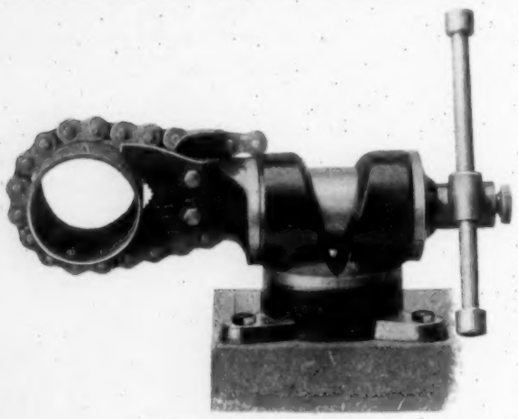


FIG. 8.—A PIPE VISE.

equipped with swivel base and rotating jaws which render the device capable of service in very many positions. The vise has an adjustable chain fastened at one end to the screw. The other end fits in a catch which holds it in position. The vise nut tightens the chain and at the same time securely locks the whole device in the desired place.

At a special meeting of the stockholders of the International Steam Pump Co. last week resolutions of the board of directors were confirmed, for the issue of $3,500,000 of debentures, and for an increase of the capital by $3,500,000 of common stock, making 185,000 shares instead of 150,000. It is provided that the bonds may be converted into common stock at the option of the holders.

The Inland Steel Co. announces that its general offices have been moved to its main works, Indiana Harbor, Ind., which will hereafter be the company's post office address. It will continue to maintain offices at 1225 and 1226 Marquette Building, Chicago, and all telegrams should be addressed to Chicago. The company can be reached by telephone through its city office or by long distance at Indiana Harbor.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The Frank Way Foundry & Machine Co., of Chillicothe, Mo., has been incorporated with a capital of $50,000, to manufacture machinery, implements, building materials and wood and iron commodities. Incorporators are Frank Way, R. L. Isherwood, J. W. Dienst.

The Hayward Foundry & Machine Co., Monongahela City, Pa., has been incorporated under the laws of Pennsylvania.

The Toledo Steam Pump & Trap Co., Toledo, O., has been incorporated with a capital of $50,000 under the laws of Delaware and a plant will be erected.

The National Boiler Works Co., Superior, Wis., has been incorporated with a capital of $10,000. The incorporators are W. D. Dwyer, J. R. Hill and F. A. Ross.

The Price-Evans Foundry Co., of Chattanooga, Tenn., has been incorporated with a capital of $40,000. The incorporators are J. E. Price, C. D. Richmond, Mrs. Martha Evans, Miss Martha Evans and Theodore Richmond. The company will manufacture brass and iron products and will buy and sell iron. The concern has formerly been operated by a firm.

The Ashland Steel Range Works, Ashland, O., are being organized and will soon start the erection of a plant for the manufacture of steel ranges.

The Abram Cox Stove Co., Lansdale, Pa., whose plant was partially destroyed by fire Dec. 4, causing a loss of $15,000, is rebuilding and will have the new plant finished in about two weeks, when several polishing lathes and polishing supplies will be purchased.

The Ironton Engine Co., Ironton, O., has been incorporated with a capital of $200,000. D. H. Palmer and J. B. Allfree, of Indianapolis, and H. A. Marting and A. H. Mittendorf, of Ironton, are the principal incorporators. The company will manufacture Allfree engines, erecting a plant at Ironton and abandoning the one at Indianapolis. It will employ 300 men.

The Quincy Engine Works, Quincy, Ill., which recently increased their capital from $250,000 to $400,000, have not yet definitely worked out plans for extensions, but will undoubtedly expend a portion of the proceeds of the increase of capital for machine tools and will probably purchase a steam hammer soon.

At a meeting of the stockholders of the New Castle Stamping Co. of New Castle, Pa., held last week the capital stock was increased from $100,000 to $200,000. The funds derived from this increase in the capitalization will be expended in doubling the present capacity and in the addition of a galvanizing plant. Granite and enameled ware is manufactured at present and the daily output will be increased from 4,000 to 8,000 pieces.

The Nyack Machine Works of Nyack, N. Y., has been incorporated with $25,000 capital. J. G. Dunbar, W. H. Canfield and D. B. Hutchinson are the incorporators.

The St. Louis Pneumatic Tool Co. of St. Louis, Mo., has been incorporated with $500,000 capital for the purpose of engaging in the manufacture of steam and pneumatic tools and appliances. C. F. Bates, T. S. Maffit, T. H. West, W. K. Bixby and A. C. Stewart are the incorporators.

The Frontier Iron Works of Buffalo, N. Y., has been incorporated with $10,000 capital for the purpose of operating an iron foundry. F. B. Cooley, W. F. Simon and J. H. Morey are the incorporators.

Baltimore & Annapolis Short Line Railroad, Phillip Cooper, engineer in charge, Annapolis, Md., will need engine, boiler, shop tools, etc., for shop.

The Denman & Davis Co of Esopus, N. Y., has been incorporated with $75,000 capital for the purpose of manufacturing iron and steel products. A. C. Denman, W. E. Davis and R. F. Heiles are the incorporators.

The Columbia Foundry Co. of Cincinnati, O., has been

incorporated with $25,000 capital for the purpose of erecting and operating a gray iron foundry. A. G. Olberding, T. P. Leaman, P. H. Guthrie, J. F. Helberger and R. M. Burton are the incorporators.

The Diamond Iron Works of Minneapolis, Minn., has been incorporated with $100,000 capital. H. H. Smith, J. P. Smith, R. B. Smith, and E. T. Melony are the incorporators.

The Stiles Morse Co. of Chicago, Ill., has been incorporated with $25,000 capital for the purpose of engaging in the manufacture of machinery. E. S. Stiles, C. W. Rhodes and L. Korets are the incorporators.

The Chicago Heights Malleable Iron Works of Chicago Heights, Ill., has been incorporated with $50,000 capital to operate a malleable foundry. W. E. Canedy, J. J. Hood and A. W. McEldowney are the incorporators.

Bridgeford & Co., Louisville, Ky., want second-hand eight-foot brake and a large lever shear, for working steel as heavy as No. 10.

H. B. Bloom, Box 392, Charlotte, N. C., wants Barnes foot-power lathe; six-foot bed preferred.

Empire Lumber & Mfg. Co., Jackson, Miss., will want two 75 or 100-h. p. boilers.

The Ypsilanti Pressed Steel Co. is to be organized at Ypsilanti, Mich., with a capital of $25,000 for the purpose of making the Comstock ventilating automatic window sash fastener and other articles of pressed steel.

A partnership has been formed by Clem. A. Trask and Rayner Field, Jackson, Mich., to build gas and gasoline engines, from the Trask patterns. The new firm has secured quarters into which it will move Jan. 15.

John L. Faulhaber, the manufacturer of the Faulhaber gas engine, has sold his foundry and machine shop at Fostoria, O., to Cleveland men, who will incorporate under the name of the Fostoria Foundry & Machine Co. Additions which will double the capacity of the plant will be built and a large amount of new machinery will be installed. The new company is composed of O. C. Ringle, J. A. Ohlinger, Walter Wainwright, Frank Jones, Elmer E. Lyons and C. H. Olds. Mr. Wainwright, formerly of the Massillon Iron & Steel Co., will be superintendent of the Fostoria plant.

New Construction:

At Birmingham, Ala., H. P. Beggs & Son will build plant for manufacturing iron piping and iron beds, about $35,000 to be invested.

The Valley Iron Co., Valley Head, Ala., has received plans and specifications for construction of its proposed 200-ton blast furnace. It is expected that contracts will be awarded soon. Offices at 2024 First avenue, Birmingham.

The Midvale Mining Co., Walnut Grove, Ala., recently chartered with $100,000 capital, has purchased and will develop coal and iron lands near Walnut Grove.

The Monterey Iron & Steel Co., which is completing an extensive plant in Monterey, Mex., equipped with American machinery, will add a Bessemer plant at an estimated cost of $300,000.

The Austin Foundry Co., Minneapolis, Minn., will erect a two story frame foundry at a cost of $1,200.

W. J. Fell, of Salt Lick, Ky., has purchased a site of ten acres and will soon begin the erection of machine shops. Mr. Fell already employs nearly 1,500 men in numerous enterprises.

Excavating has been begun for the foundation of blast furnace F at Minnequa steel works of the Colorado Fuel & Iron Co. The new furnace is the sixth in the row at Minnequa. It is expected that the excavating will be finished about Jan. 15.

The Battle Creek Iron Works Co., Ltd., Battle Creek, Mich., is nearly ready to turn out gray castings from its new plant.

S. H. Harris & Co., Chicago, Ill., will erect a plant for the manufacture of safety vault doors. The building will be three stories, 48x100 feet, and cost $20,000.

The Lawrence & Methuen Street Railway Co., Lawrence, Mass., has purchased a site for a new power house, which will be erected at Methuen.

The Ottumwa Box Car Loader Co., Ottumwa, Iowa, expects to build a foundry in the spring, 90x170 feet, in connection with present machine shop plant.

Stohr & Freund, Muscatine, Iowa, contemplate building a foundry late in the spring.

The Mansfield Engineering Co.'s new foundry will be built this winter. The building will be 75 by 175 feet and will contain a 25-ton traveling electric crane. Building will be completed by the last of April.

The Coe Mfg. Co., Painesville, O., will enlarge its plant, adding a building 350x75 feet, which will be used for the manufacture of drying machines.

The E. M. Roberts Co., Ashland, Ky., recently incorporated with a capital of $15,000, is erecting a brick building 90x45 feet, one half to be used as a foundry, the other as a machine shop. An overhead crane of 24 feet span, 3 tons capacity, will traverse the entire length of the shop. The crane is being furnished by the Cleveland Crane & Car Co. A Colliau cupola furnace, of 4 to 5 tons capacity will be put up. The company will do general jobbing work for mills, furnaces, mines, etc., and manufacture the Howard water filter and the Scott broom rack (to be used in wholesale houses).

The Toledo Stove Co., Toledo, O., contemplates making extensive additions to its plant.

The extensions decided upon the Allis-Chalmers Co. to be made in the plant of the Gates Iron Works, Chicago, include the combined foundry and machine shop, one and four stories high, 120x260 feet, costing $225,000.

H. H. Smith, proprietor of the Diamond Iron Works, Minneapolis, has started work on the new buildings for the works. The foundry will be 55x154 feet. Next summer work will be commenced on a machine shop, adjoining the foundry.

Work has been started at the Vulcan Iron Works, Wilkesbarre, Pa., on the machine shop, 500x200 feet.

The St. Paul Foundry Co., St. Paul, Minn., has taken out permits for the following buildings: Coalhouse, $700; pattern shop, $2,500; structural fitting shop, $17,000; enlarging foundry building, $33,000; total $53,700.

Elaborate plans have been prepared for the new shops of the Lackawanna Railroad Co., at Keyser Valley, a suburb of Scranton, Pa. There will be 15 buildings which will be erected at a cost of $500,000. The site is now being graded, and the contract for the steel work has been let. The power house, 50x150 feet, will be built first. The blacksmith shop will be 80x100 feet. Just outside the blacksmith shop will be an iron house, 25x50 feet. Near the repair yard will be a series of material shops. In front of the mill and machine shop there are to be two freight shops, 150x400 feet each, to hold 48 cars apiece, and a large lavatory between the two buildings. The two freight shops will be equipped with 15-ton electric cranes. Light for the entire plant will be electric. The machinery from the present car building plant will be used in the new plant, but considerable new machinery will be added.

The Toledo Plow Co., Toledo, O., has decided to double the size of its foundry.

The Price-Evans Foundry Co., Chattanooga, Tenn., has plans outlined for practically doubling the present output of its plant. Contracts will be awarded early in the year.

The National Enameling & Stamping Co. has plans prepared for the erection of a large enameling and stamping plant at New Orleans, La.

Fires and Accidents:—

The dropping of the elevator at one of the stacks of the Dunbar Furnace Co., Dunbar, Pa., last week resulted in the death of one workman and the serious injury of four others.

The lighting plant of the Allegheny, Pa., plant of the Pressed Steel Car Co., was destroyed by fire last week entailing a loss of $15,000.

Fire at the plant of the Snead Architectural Iron Works, Louisville, a few days ago, caused a loss of $25,-

000; insurance, $21,500. The foundry and pattern room were destroyed and much damage was done to the machine shop and to patterns. Rebuilding will begin at once.

The Vaughn Machine Works, Peabody, Mass., were damaged by fire to the extent of $30,000, Dec. 26.

The plant of the George B. Freeman Mfg. Co., Racine, Wis., suffered a loss of $20,000 by fire last week.

General Industrial Notes:—

Dresser T. Bates, Stephen E. French and Frank S. Ewing, all of Orange, Mass., have purchased the controlling interest in the Athol Machine Co., Athol, Mass., of Stephen H. Bellows and John P. B. Wells. The new owners have taken possession.

The York Mfg. Co., of York, Pa., builder of refrigerating apparatus, is equipping its works for electric power distribution, and has recently purchased from the Westinghouse Electric & Mfg. Co. a number of direct-current, 220-volt motors.

The old wire nail plant at Salem, O., is now in possession of the Findlay Axe & Tool Co. The consideration is understood to be $8,000. The new owner will move its plant into Salem at an early date.

The Hopkins Brake Co., St. Louis, recently incorporated with a capital of $50,000 to manufacture railway brakes and supplies, has not developed its plans further than to contract with the St. Louis Transit Co. for the use of the brake on its lines. After a trial of two months, the brake is said to have given satisfactory results.

The Shenango Valley Steel Mill of the National Steel Co. at New Castle, Pa., resumed operations this week after an idleness of one week. The mill was shut down for repairs and is prepared for a long steady run.

The Atlantic furnace of the Republic Iron & Steel Co., New Castle, Pa., resumed operations this week after an idleness of several months owing to the shortage of coke. The Haselton mill of this company at Haselton, O., will resume operations shortly after the first of the year.

The entire plant of the American Sheet Steel Co. at Canal Dover, O., is now inoperative. The main shaft in that portion of the plant not destroyed by fire was broken several days ago and it will be several weeks before it can be replaced. It has been decided to erect a steel building to replace the one recently destroyed by fire and such improvements will be made to the machinery which will permit of the operation of the entire plant at an early date.

Ground was broken last week for the erection of two open-hearth furnaces at the plant of the Eastern Steel Co., Pottsville, Pa. Plans provide for the erection of four furnaces, but for the present only two will be gone ahead with. A large core room is being added to the foundry and other improvements are being made.

Obituary.

William P. Tyler, president and principal stockholder of the Tyler Tube & Pipe Co. of Washington, Pa., died Saturady afternoon, December 27, at the Waldorf Astoria, New York. Deceased had been ailing for several years and recently made several trips abroad for his health. In 1890 he established the plant at Washington, Pa., which bears his name and was otherwise financially interested in developing this town industrially.

Horace Humphrey, founder of the foundry which bears his name and which is now operated under the firm name of Humphrey & Sons, passed away at his home in Joliet, Ill., on Sunday, December 21, at the age of 76 years. In 1860 the Humphrey Iron Works was established and the plant has been continually operated since.

Chas. Bishop, who was for 15 years superintendent of the Forest City Spring Works, Cleveland, died in New York, December 26, aged 50 years. Injuries sustained several years ago caused his retirement and he moved to New York.

James W. Arrott, organizer of the Standard Mfg. Co., of Pittsburg, passed away at his home, Glen Osborne, near Pittsburg, Dec. 29, aged 67 years. He had been actively engaged in the manufacture of sanitary ware and supplies for the past 27 years. Three years ago he was foremost in the organization of the Standard Sanitary Mfg. Co., which absorbed the Standard Mfg. Co., and about a year ago he left the combine and established the United States Mfg. Co. at Monaca, Pa.

James J. Lonergan, president of the City Foundry Co., Cleveland, died Dec. 26, after a long illness, aged 40 years. Mr. Lonergan had been at the head of that company for a number of years.

PERSONAL.

W. C. Herron, of Rogers, Brown & Co., Cincinnati, has sold out his interest to his partners and will retire from business on Jan. 1. He has been connected with this firm for 17 years. Mr. Herron will take an eight months' trip abroad. His health has been impaired for some time and he has made no definite business plans for the future.

Edward C. Smith will take charge of the St. Louis office of Robert Field on Jan. 1. He will sell the Sloss-Sheffield Steel & Iron Co.'s iron in that territory.

A Kennedy Ashworth, formerly of the firm of D. Ashworth & Son, consulting steam engineers, and later for a number of years in charge of the engineering department of the Pittsburg Gage & Supply Co., Pittsburg, has accepted as assistant manager of the Underfeed Stoker Co., with headquarters in the Marquette Building, Chicago, after Jan. 1.

W. J. Walters, an expert accountant, employed for many years in the offices of the New Kensington, Pa., plants of the American Tin Plate Co. goes to the main offices in New York where he will hold a similar position.

William S. Lewis, general superintendent of the plants of the Sharon Steel Co., Sharon, Pa., was remembered on Christmas with a phaeton, a gift from the employes of the mill.

O. W. Brain, electrical engineer of the New South Wales Government Tramways, spent several days in Pittsburg last week consulting the Westinghouse Electric & Mfg. Co. relative to placing a contract for electrical machinery.

F. J. Hearne, formerly president of the National Tube Co. and a director of the Union Trust Co., Union Savings, Mellon National and Keystone banks of Pittsburg, and J. D. Culbertson, second vice president and treasurer of the National Tube Co. have been chosen directors of the new Security Trust Co. of Wheeling, which starts with $300,000 capital and $150,000 surplus.

Morgan J. Hammers has resigned as mechanical superintendent of the Rock Island Plow Co., Rock Island, Ill., to become superintendent and mechanical engineer for the Phoenix Iron Works at Meadville, Pa.

William Harty, superintendent of the Oswego, N. Y., plant of the Railway Steel Spring Co., has resigned. He will be succeeded by George Kinney.

Bernhard A. Behrend has been made chief engineer of the Bullock Electric Mfg. Co., of Cincinnati. He has been connected with this company for the past two years as chief engineer of its alternating department and has made a reputation as a designer of dynamo electric machinery. Mr. Behrend was born in Pomerania, Germany, in 1875 and studied engineering under Helmhaltz, Kundt, Slaby, Riedler and Kapp. For a time he was assistant chief electrician of the Oerlikon Co. at Zurich, Switzerland.

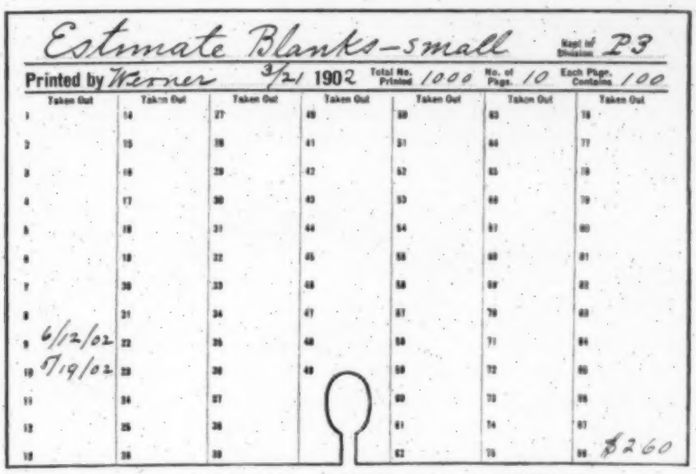
J. E. Thompson, of the engineering department of the Central Furnaces, Cleveland, removes to Joliet, Ill., to become connected with the operating department of the American Steel & Wire Co.'s plant in that city.

Northern Electrical Mfg. Co., Madison, Wis., manufacturer of electrical machinery, informs us that its shops are full of orders and that deliveries on new business cannot be made under two months. An extensive addition is just being completed, providing for a complete power plant and increased room for several badly crowded departments.

Scully Steel & Iron Co., Chicago, is receiving a good many inquiries for machinery and tools, and in the past 60 days has sold quite a large number. The indications point to a good business in the coming year.

A System of Keeping Track of Office and Shop Stationery.

The Inland Type Foundry, of St. Louis, has described in one of its recent publications a method of keeping in touch with the varied stock of stationery which accumulates so irregularly in the office and stock room and which on occasion has so annoying a trick of disappearing unaccountably. Almost every office which uses a great deal of stationery or printed matter has more or less trouble in keeping track of it. Very often, just when badly needed, some certain blank or card runs out, necessitating exasperating delay, extra haste and often poor work on the part of the printer in getting out a new supply. Very often stationery is misplaced or overlooked, and when the new lot is printed it is found that there is an ample supply of the old at hand. It often takes considerable research to find out who was the printer, the quantity used, when the supply is likely to run out, as well as the cost, and the quantity which should be ordered. It is also desirable to have a plan by which, if a change is to be made in the new edition, a note to that effect can be made without danger of overlooking it. The plan devised and used by the Inland Type Foundry is very simple and inexpensive. By its use not only can the desired piece of printed matter be found instantly, but at any moment the system will tell the cost, how much is on hand, when it is likely to run out and from whom it should be procured. Here are the details:


Estimate Blanks—small Dept. or Division P 3

Printed by Werner 3/21 1902 Total No. Printed 1000 No. of Pkgs. 10 Each Pkge. Contains 100

Taken Out	Taken Out	Taken Out	Taken Out	Taken Out	Taken Out	Taken Out
1	14	27	40	53	66	79
2	15	28	41	54	67	77
3	16	29	42	55	68	78
4	17	30	43	56	69	79
5	18	31	44	57	67	80
6	19	32	45	58	68	81
7	20	33	46	59	69	82
8	21	34	47	57	70	83
9 6/12/02	22	35	48	58	71	84
10 7/19/02	23	36	49	59	72	85
11	24	37		60	73	86
12	25	38		61	74	87
13	26	39		62	75	88 $2.60

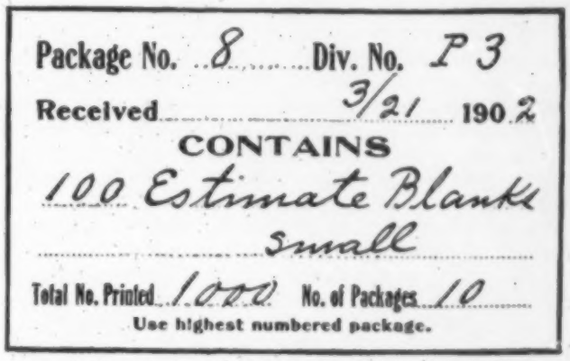
FIG. 1.—A STOCK CARD FOR OFFICE AND SHOP STATIONERY.

When printed matter is ordered, the order specifies into how many packages it must be wrapped. When it is received by the clerk who has charge of the stationery, a sample is reserved and pasted in a scrap book, together with the date, the amount and the cost, which last may be in cipher if desired. The stationery is all kept in a large cabinet, the different divisions of which are marked with letters. Whenever a new lot of matter is received, the bundles are counted to see if they agree with the requisition and a card is filled out like figure 1. It is hardly necessary to say that at this time nothing is written against the numbers, which fill the greater part of the sheet. In the Inland Type Foundry's office a stock card is used (shown reduced in the illustration), which, as will be noted, contains but 88 numbers. This card measures 4x6 inches. Where a great number of packages are to be used, it is better to get a little larger card, so as to contain 100 numbers. It is unnecessary in most cases to have a hole for a rod, so that all the lower space may be utilized. If more than 100 packages are to be used, which is seldom the case, a small supply of additional cards running from 101 to 200 and from 201 to 300 can be procured. In case a large number of packages are received, two or three cards can be used, each bearing the same heading, the card with the highest number being placed on top and the cards fastened together with a wire clip. The clerk in charge of the stationery and other matter looks up and sees where there is space in the cabinet for the fresh consignment (in this illustrative case Estimate Blanks), and then puts the proper letter in the upper right-hand corner of the card (P 3).

A little experience will soon demonstrate the size packages which are required for each instance, the cards themselves being a fair indication as to how rapidly each particular kind of stationery is used up. Before putting away a lot, to each package is attached a label similar to figure 2. Each label has not only a description of the contents, but states the quantity in the package, the total number of packages and the number of the package. The stationery clerk has rigid instructions to always take out the highest numbered package, in this case No. 10.

After the entries are made and the packages put away on their proper shelves, the cards are filed alphabetically in an ordinary indexed card tray. If any one requires stationery of any particular kind, the requisition is presented to the clerk who has it in charge and the proper card is found in the tray. A glance shows that in this case there are 8 packages left, consequently the clerk will go directly to the cabinet, and take out of Division P 3 package No. 8, deliver it and enter the date on the card. While so doing, this clerk glances at the card and notes how many packages are remaining. The blank spaces above the dates show this, while the dates themselves show how many packages have been used. By comparing the first date with the last, the quantity used within a certain time is easily ascertained, and if the stock on hand is running short an order is made out for a further supply, notation being made on the face of the card to that effect. If the dates of the old card (which is kept in another part of the tray) indicate that a large quantity is used an inquiry is made if the same piece of stationery is likely to be in constant use, and a greater quantity is ordered. If the dates on the card indicate that the amount last printed is sufficient to last for an extended time, a lesser quantity is ordered. If desired, in addition to the date, room may be left on the card for the requisition number, or another column may be added, in which a letter or a number indicates the person or department to whom these blanks were delivered, and in this way track is kept of where the goods have gone. Other modifications can, of course, be made to suit various demands, but this plan has worked like a charm in the Inland Type Foundry.

It no longer happens that a salesman writes in that he must have some more cards by return mail when none are at hand. It no longer happens that the bookkeeper, toward the end of the month, informs the stationer that he must have more statements the next day. It no longer happens that some circulars are poorly gotten out in a great rush, only to discover several weeks afterward that there was an ample supply put away in some corner and forgotten. Although over 1,000 different kinds of printed matter are kept in stock, the supply is kept in such shape that it is seldom necessary to order anything in a very great hurry. The proper amount is ordered, and the printer given sufficient time to get it out in presentable style.


Package No. 8 Div. No. P 3

Received 3/21 1902

CONTAINS

100 Estimate Blanks

small

Total No. Printed 1,000 No. of Packages 10

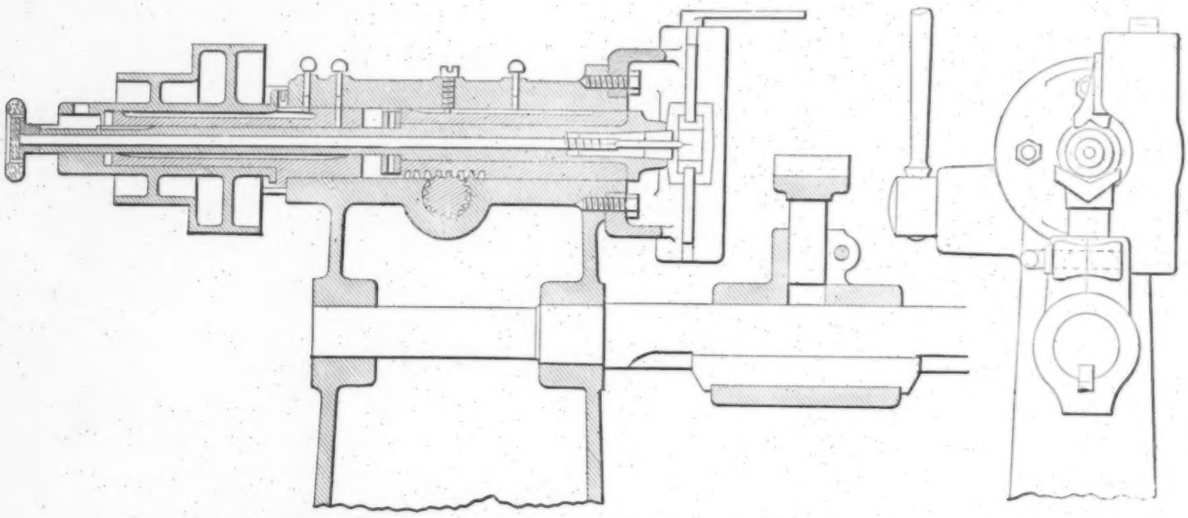
Use highest numbered package.

FIG. 2.—PACKAGE LABEL FOR OFFICE AND SHOP STATIONERY.

THE BINGHAMTON CENTERING MACHINE.

These machines are made in four sizes and each machine will drill and countersink the centers in shafts of any length at one operation and at one setting of the work. They are so designed that the self-centering drill chuck is entirely within the spindle of the machine, and the drill is so held in the chuck that only so much of it as is required in centering projects beyond the spindle. The vise for holding the work is placed as close as possible to the spindle. The machine is shown in detail in the illustration.

The spindle has extra long bronze bearings, and the construction is such that it is very stiff; and the distances between the spindle and the work being very short, make an extremely rigid machine for centering work accurately, as the vise is in perfect alignment with the spindle. The machine has a positive stop, and by placing the work properly in the vise, the work can be centered to a uniform and to any required length. The vise is a carefully made universal scroll chuck (with ample wearing surfaces and hardened jaws ground perfectly true) and holds one end of the work central with the spindle; an adjustable graduated rest, movable on the support bar of the machine, supports the other end. The machines are designed for using the combination center drills, doing at one operation that which otherwise requires two. This has the advantage of doing the centering in a shorter space of time than is possible on a two-spindle machine. It insures that



THE BINGHAMTON CENTERING MACHING.

every center shall be drilled deep enough without attention and that the countersink shall always be perfectly true with the center hole, which is a matter of considerable importance in turning tapers, or in cases where it may be desirable to square off the end of the work after it is finished. The old center can be nearly squared out and the piece still run true, or the center can be entirely squared out and recentered in the machine so as to run perfectly true. It does not require that the ends of stock be squared up, as it will center a rough or beveled end as well as a square end.

The oil supply is obtained from a conveniently placed oil reservoir having a feed pipe so arranged that the oil is made to flow upon the cutting tool at all times. A drip can to catch the oil is also furnished.

Each machine is furnished with a drill socket, half-dozen assorted combination center drills, countershaft and all accessories required to operate the machine, including a rear support for long stock, something which is not furnished with any other centering machine. Machines having three jaw chucks are recommended for centering round stock, on account of the slight imperfections in ordinary rolled iron and steel. Machines having four jaw chucks for square stock can be furnished when specially ordered.

The machine is made in four sizes by the Binghamton Machine Tool Works, of Binghamton, N. Y. The Nos. 1, 2, 3 and 4 are respectively 350, 400, 800 and 850 pounds weight, and have a working capacity of 0 to 3⅛ inches, ¼ to 4⅛ inches, ¼ to 5⅛ inches and ½ to 7⅛ inches.

Record Shipments Through the Soo.

The traffic through the waterways at Sault Ste. Marie, Michigan and Ontario, for 1902, amounted to 35,961,146 freight tons, exceeding that of any year, and being 7,558,081 tons in excess of 1901. The increase was in all kinds of freight. Eastbound the shipments of iron ore were 21,796,348 net tons through the United States canal and 2,481,207 through the Canadian, making a total of 24,277,555. Pig iron shipments were only 11,863 through the United States canal and 1,531 through the Canadian, making a total of 13,394. Westbound, manufactured iron shipments were 142,803 net tons through the United States canal and 41,955 tons through the Canadian, total, 184,758 tons.

The constant growth of the demands for power has made it necessary for the New York Edison Co. to arrange for new generators, rotary converters and transformers. The Stanley Electric Mfg. Co. has secured this contract through its New York office. The unusual size of the units is noteworthy. The first item in the contract is for four 2,000 k. w. rotary converters. The transformer equipment consists of twelve 800 k. w. static transformers of the air-blast type and four auto-regulators. The largest rotaries hitherto built are the 1,500 k. w. units in the Manhattan sub-stations. In addition, the contract calls for ten 1,000 k. w. rotary converters with thirty 400 k. w. static transformers of the air-blast type and ten auto-regulators. The above will be placed in various sub-stations of the Edison system. The Stanley Electric Mfg. Co. will also furnish three new generating units for the Waterside Station. They will be 3,500 k. w., 25 cycle, three-phase, alternating current generators, direct-connected to engines working at 75 r. p. m.

The net earnings of the Dominion Iron & Steel Co., Sydney, Nova Scotia, for November with three furnaces in operation were $50,000. This includes the government bounty. The October net earnings were $45,000. The directors have voted not to erect a steel rail mill at present as was contemplated, but to use the new mill for the manufacture of structural and other forms of steel.

The Canadian Pacific Railroad expects to receive this month several locomotives of the 35 recently ordered to be built in Glasgow, Scotland.

Four hundred employes of the Trenton Works of the American Bridge Co. went on a strike last week because one of their number was discharged.